July 2021

Binder 182, Plagiorchiidae Brachycoelinae Mesocoelinae [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

BRACHYCOELIIDAE Johnston, 1912

Family diagnosis. — Distomes with elongate to oval spinulate body. Oral sucker subterminal, pharynx present. Ceca very short. Acetabulum small, more or less pre-equatorial. Testes symmetrical or oblique, in middle third of body or a little more anteriorly. Cirrus pouch present. Genital pore pre-acetabular. Ovary submedian, pre- or posttesticular. Vitellaria follicular, in anterior part of body. Uterus mainly posttesticular. Excretory vesicle tubular, may be divided anteriorly into two short furcae. Parasites of amphibians and reptiles.

Type genus: *Brachycoelium* (Duj., 1845) Stiles et Hassall, 1898.

Key to subfamilies of Brachycoeliidae from amphibians

Ovary posttesticular ..... Mesocoeliinae
Ovary pretesticular ..... Brachycoeliinae

Key to subfamilies of Brachycoeliidae from reptiles

Ovary pretesticular ..... Brachycoeliinae
Ovary posttesticular ..... Mesocoeliinae

Brachycoeliinae Looss, 1899

Subfamily diagnosis. — Brachycoeliidae: Body elongate, spinose. Oral sucker and pharynx small, esophagus short or long. Ceca short, not surpassing acetabulum. Acetabulum small, in anterior half of body. Testes symmetrical or diagonal, acetabular or postacetabular. Cirrus pouch preacetabular and may or may not extend posterior to acetabulum. Genital pore immediately preacetabular. Ovary submedian, pretesticular or opposite anterior testis. Vitellaria massed on each side of esophagus and ceca, mainly in neck and shoulder region, or extending along each lateral margin in esophago-ovarian zone. Uterus reaching posterior extremity, passing between two testes. Excretory vesicle tubular.

Brachycoelium (Dujardin, 1845) Stiles et Hassall, 1898

Generic diagnosis. — Brachycoeliidae, Brachycoeliinae: Body elongate, sometimes fusiform, spinulate. Oral sucker well developed, pharynx small, esophagus short, ceca elongated saccular, divergent oppositely or forming an inverted V-shape. Acetabulum smaller than oral sucker, in anterior or middle third of body. Testes symmetrical, in acetabular or postacetabular zone. Cirrus pouch entirely in front of acetabulum or overlapping it. Genital pore immediately pre-acetabular. Ovary submedian, anterior to right or left testis. Vitelline follicles grouped in neck or shoulder region, may or may not extend backward to ovarian or testicular level and inward across median field. Uterine coils occupying most of hindbody.

Excretory vesicle Y-shaped, with long stem. Intestinal parasites of amphibians and reptiles.

Genotype: *B. salamandrae* (Froelich, 1789) (Pl. 43, Fig. 528), syn. *B. crassicolle* (Rud., 1809) Looss, 1899, in *Salamandra atra, Bufo, Rana, Molge, Triton, Desmognathus, Eurycea, Plethodon, Terrapene, Pseudacris, Hyla;* Europe, Canada, U.S.A. Also in *Salamandra maculosa, Anguis fragilis;* Africa.

Other representatives from amphibians:

- **B. daviesi* Harwood, 1932, syn. of *B. salamandrae* (Froel.) — Rankin (1938), in *Leiolopisma laterale, Pseudacris triseriata, Hyla cinerea,* and *Amblystoma microstomum;* U.S.A.
- *B. dorsale* Byrd, 1937, syn. of *B. salamandrae* (Froel.) — Rankin (1938), in *Amblystoma opacum;* Pearl River, La.
- *B. georgianum* Byrd, 1937, syn. of *B. salamandrae* (Froel.) —Rankin 1935, in *Rana sphenocephala;* U.S.A. (Athens, Ga.).
- **B. hospitale* (Stafford, 1900) Looss, 1902, syn. of *B. salamandrae* Froel. — Rankin, 1938, in *Diemyctylus viridescens* and *Plethodon erythronotus;* Canada. Also in *Rana sphenocephala, R. virescens, R. aesopus, Bufo terrestris B. fowleri, Amblystoma opacum, Plethodon glutinosus, Ophisaurus ventralis, Pseudacris brimleyi, Hyla crucifer, Triturus meridionalis, T. viridescens;* U.S.A.
- *B. louisianae* Byrd, 1937, syn. of *B. salamandrae* — Rankin, 1938, in *Amblystoma opacum;* U.S.A. Also in *Rana catesbiana;* Georgia.
- *B. lynchi* Ingles, 1936, in *Rana aurora;* U.S.A. Transferred by Rankin, (1938) to *Lecithodendrium.*
- **B. meridionale* Harwood, 1932, in *Triturus meridionalis;* U.S.A. Also in *Desmognathus fusca, Plethodon glutinosus;* Ga.
- *B. mesorchinum* Byrd, 1934, syn. of *B. salamandrae* Froel. — Rankin 1938, in *Desomgnathus fusca fusca;* U.S.A.
- *B. retusum* Duj., 1845, in *Rana temporaria;* Rennes. Also in *R. esculenta, R. halecina, Phryganea grandis* — Hall, 1929.
- **B. trituri* Holl, 1928, in *Triturus viridescens;* U.S.A.

over

Key to genera of Brachycoeliinae

Excretory vesicle reaching to pharynx; testes diagonal; cirrus pouch large; vitellaria marginal ..... *Cymatocarpus*

Excretory vesicle not reaching to pharynx; testes symmetrical or subsymmetrical; cirrus pouch small; vitellaria not confined to marginal area ..... *Brachycoelium*

Brachycoelium (Dujardin, 1845) Stiles et Hassall, 1898

Generic diagnosis. — See p. 398.

The following representatives from amphibian and reptilian hosts are regarded by Rankin (1938) as synonyms of *B. salamandrae*.

B. daviesi Harwood, 1932, in *Leiolopisma laterale, Pseudacris triseriata*. Also in amphibians (*Hyla cinerea* and *Amblystoma microstomum*); *B. dorsale* Byrd, 1937; *B. georgianum* Byrd, 1937; *B. louisianae* Byrd, 1937; *B. meridionalis* Harwood, 1932; *B. mesorchium* Byrd, 1937; *B. obesum* Nicoll, 1914, in *Contia aestiva; B. ovale* Byrd, 1937, in *Leiolopisma laterale; B. storeriae* Harwood, 1932, in *Storeria dekayi, Distoma flavocinctum* von Linstow, 1879; *D. hospitale* Stafford, 1900.

Plagiorchidae Bracycoeliidae

BRACHYCOELIUM (Duj.) Stiles & Hass.

The following diagnosis is from Lühe:

Body strongly elongated. Skin spined. Excretory vesicle Y-shaped. Genital pore somewhat in front of ventral sucker; cirrus sac present but very small almost entirely in front of ventral sucker. Testes close behind, ovary near ventral sucker. Vitellaria in the sides of the body, Uterine coils behind the testes chiefly in cross coils, in the hind end of the body gradually more longitudinal. Type species: B. salamandrae (Frol.) (syhonym: Distomum crassicolle Rud.)

B. salamandrae (Frol)

3. to 5. by 0.8 to 0.12 .
Oral sucker 0.26 to 0.31
Pharynx 0.083 to 0.10
Ventral sucker 0.20 to 0.26, lying about at the border of the ~~1~~ first third of the body length.
Eggs 45 to 50 by 32 to 36 μ
Hosts: Salamandra maculosa Laur.
S. atra
Molge cristata
M. alpestris
M. vulgaris
Bufo vulgaris
Anguis fragilis

Ceca reach to ventral sucker a in Lühe's figure overlap it slightly, as well as overlapping the ovary slightly.

In B. hospitale the ceca do not overlap the ventral sucker and do not reach the ovary. B. salamandrae is spined. B. hospitale unspined.

Genus BRACHYCOELIUM Dujardin, 1845

The genus *Brachycoelium* (as a subgenus of *Distoma*) was erected by Dujardin (1845) for the reception of the species *Brachycoelium crassicolle* (Rudolphi) (=*Distoma crassicolle* Rudolphi, 1809). Looss (1899) utilized the genus as the type around which to establish his subfamily Brachycoeliinae. Later S. J. Johnston (1912) elevated Looss' subfamily to the rank of family, Brachycoeliidae, which now includes the three well-known genera *Brachycoelium* Dujardin, 1845, *Glypthelmins* Stafford, 1905, and *Mesocoelium* Odhner, 1911. Faust (1929) included the family Brachycoeliidae in his superfamily Dicrocoelioidea.

The genus *Brachycoelium* is characterized as follows: Body elongated, more or less cylindrical; cuticle with or without (?) spines; suckers subequal; acetabulum at about equator of body; intestinal caeca short, diverging posterolaterally from bifurcation, ending short of level of acetabulum; ovary anterior (posterior in *B. lynchi*) to opposed testes, slightly smaller than male glands; genital pore ventral, in midline immediately in front of acetabulum; uterus sinuous, rather simple; ova small, thick-shelled, operculated; vitellaria follicular, anterior to level of acetabulum; excretory bladder Y-shaped, with short cornua; parasitic in intestine of amphibians and reptiles.

Harwood

~?

Plagiorchiidae

Brachycoelium salamandrae (Frolich).

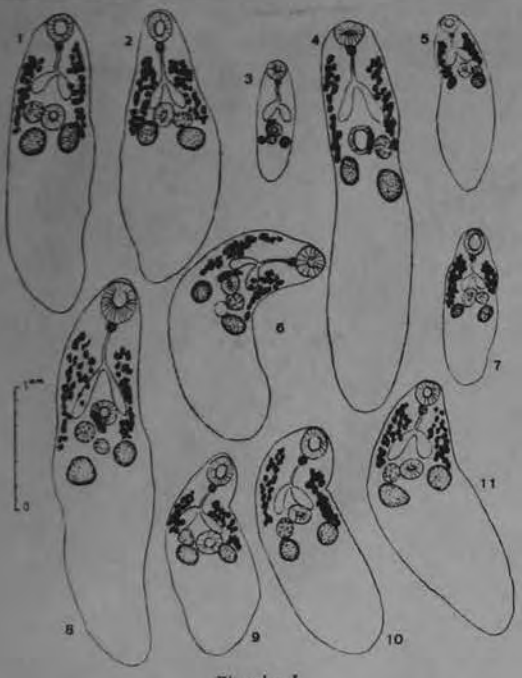


Planche I

Brachycoelium salamandrae (Frolich). Divers individus provenant des Euproctes, dessinés à la même échelle. (Microprojection).

Rapp. Comm. int. Mer Médit., **19**, 5, pp. 813-815, 3 fig. (1969).

FROM TIMON-DAVID AND GIUDICELLI (1969)

Family Brachycoeliidae Johnston, 1912
Subfamily Brachycoeliinae Looss, 1899
***Brachycoelium salamandrae* (Froelich) Dujardin, 1845**

Observations were based on 26 specimens from the small and large intestine of seven snakes representing two host species. Rankin (1938) in his discussion of the genus reduced to synonymy all of the members of this genus occurring in the United States. He concluded that characteristics upon which these species were based were too variable to be considered of specific importance. The author is in agreement with Rankin.

All of the measurements of the present material fall well within the limits of this species as outlined by Rankin.

Both hosts recorded in this study represent new host records for Louisiana.

FROM RABALAIS, 1969

Plagiorchidae

BRACHYCOELIUM (Dujardin) Stiles and Hass

Since the erection of the genus for the inclusion of *B. crassicolle*, seven other species have been added as follows: By Stafford (1900), *B. hospitale;* by Nicoll (1914), *B. obesum;* by Holl (1928), *B. trituri;* by Harwood (1932), *B. storeriae*, *B. meridionalis*, and *B. daviesi;* and by Ingles (1936), *B. lynchi.* This paper adds five new species to the genus.

Plagiorchidae

BRACHYCOELIUM CRASSICOLLE (Rudolphi, 1809) Byrd, 1937

I have no complete description of this species and am unable, from the descriptions and illustrations available, to assign any of the specimens in the present collection to it. *B. crassicolle* is referred to many times in the literature and appears to be the only member of the genus thus far recorded for continental Europe. In discussing the species, Stafford (1903) states that *B. hospitale* is very similar to *B. crassicolle*. "The internal organization, so far as it is known for both worms and so far as one can judge who has a practical acquaintance with only one of them, appears to be identical . . . It would seem that *B. hospitale* is somewhat smaller and slenderer than *B. crassicolle*." Nicoll (1914) remarks: "At first sight they (*B. obesum*) appear to be identical with *B. salamandrae* (=*B. crassicolle*), but their exceedingly small size and the fact that even the smallest was fully matured, raised the suspicion that this could not be the case . . . It was difficult, however, to obtain other grounds for regarding them as a distinct species."

Plagiorchiidae

BRACHYCOELIUM DAVIESI, new species¹ Harwood, 1932

PLATE 1, FIGURE 5

Specific diagnosis.—Brachycoelium: The worms vary from 0.65 to 0.95 mm in length and from 0.3 to 0.55 mm in width. Those whose measurements are equal to the smaller dimensions given are barely mature and have only a few eggs in the uterus. The body when relaxed is proportionately wider than is the case with other species of *Brachycoelium*. Usually it is about twice as long as wide. The cuticula is thin and set with small spines in the cephalic region. These disappear about the level of the genital glands. The oral sucker is subterminal and nearly circular in outline. Its diameter varies from 0.13 to 0.23 mm. It is about twice the size of the acetabulum. In the type specimen the oral sucker is 0.23 mm and the acetabulum 0.125 mm in diameter. This in my experience represents the extreme variation from the mean of 2:1. The acetabulum has its cephalic margin 0.32 to 0.42 mm from the anterior end and, therefore, is wholly behind the caudal limits of the cephalic third of the body. The prepharynx is lacking, and the oval pharynx measures 42μ to 50μ by 60μ to 65μ, with the long diameter lying transversely. The esophagus is short, being about 30μ long. From its caudal extremity the intestinal ceca extend almost directly laterad. They are largely obscured by the vitellaria. The ovary is lateral, but it may lie on either side. It is usually nearly circular in outline and very variable in size, being relatively larger in younger specimens. It averages 100μ in diameter. The ootype and Mehlis's gland can not be seen in whole mounts, but in sections they plainly show on the latero-dorsal side of the ovary. The seminal receptacle could not be located. The uterus fills the body behind the ovary, partially if not wholly obscuring the testes and Mehlis's gland. The eggs are 29μ to 31μ by 40μ to 42μ. The vitellaria are well developed. They fill the lateral fields from the ovary to the oral sucker, and a band of follicles extends across the body between the oral sucker and the genital pore. As the digestive system is included in this region these follicles make observations on this system difficult in whole mounts. In the median field, they are confined to the dorsal half of the body, but laterad they lie both dorsal and ventral to all other organs. The testes are level with the acetabulum and posterior to the ovary. The testis on the ovarian side is closely pressed against the ovary but is, nevertheless, slightly caudal to its mate. The vasa efferentia could not be traced. The genital pore lies at the cephalic margin of the acetabulum. The cirrus sac, containing a seminal vesicle, runs first cephalad and then curves laterad away from the ovary, and its distal end lies at the level of the genital pore. The excretory vesicle is quite concealed by the uterus in whole mounts, but in sections it shows as a characteristic simple sac extending to the caudal limits of the testes.

Hosts.—Leiolopisma laterale, Pseudacris triseriata, Hyla cinerea, and *Ambystoma microstomum.* As the parasites from the last two hosts mentioned are both immature, these two records must be regarded as tentative.

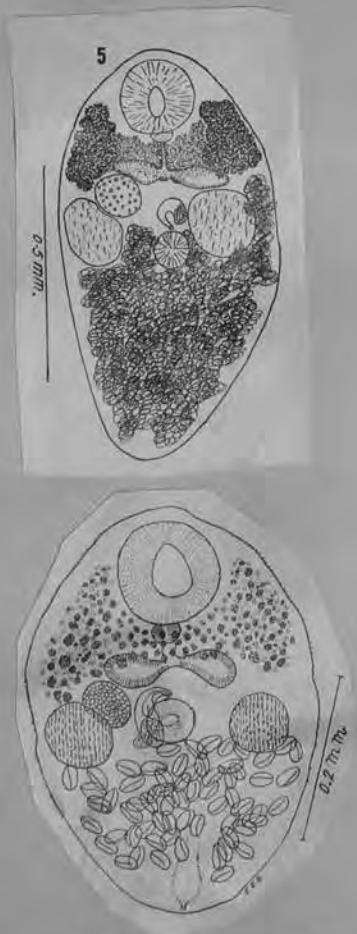
Habitat.—Intestine, more frequently in the anterior half.

Localities.—Houston and Huntsville, Tex.

Type specimen.—U.S.N.M. Helm. Coll. No. 30876; additional specimen, No. 30877.

Remarks.—Brachycoelium daviesi differs from most other species of *Brachycoelium* in many ways. The body when relaxed is proportionately wider, the esophagus is shorter, and the ovary is cephalic to the acetabulum. It is distinguished from all but *B. trituri* by the ratio of the acetabulum to the oral sucker, and from all but *B. storeriae* and *B. meridionalis* by the presence of a transverse bridge of vitellarian follicles between the lateral fields.

synonym of *B. salamandrae* (Rankin, 1938)



Proceedings of the U.S. Nat'l Museum 1933 Vol. 84 No 3010

Plagiorchidae

BRACHYCOELIUM DAVIESI Harwood, 1932

PLATE 9, FIGURE 4

Brachycoelium daviesi was described by Harwood (1932) from the intestine of *Leiolopisma laterale*, *Pseudacris triseriata*, *Hyla cinerea*, and *Ambystoma microstomum*, collected at Houston, Tex. I am able to assign to this species eight specimens from the intestine of the ground skink (*Leiolopisma laterale*) collected at New Orleans, La., and five specimens from the same host collected at Pearl River, La. The material in the present collection shows: A smaller body; an armature of spines that extend to one-third the distance beyond the testes; more uniform suckers, although these structures show a size ratio of 2:1; and a smaller ovary and smaller testes. The excretory system is typically that observed for *B. mesorchium*.

Plagiorchidae

Synonym of B. salamandrae
see Ransom, 1938

Plagiorchidae

BRACHYCOELIUM DORSALE, new species. Byrd, 1937

PLATE 9, FIGURE 2

Eight specimens of this species were taken from the intestine of the salamander *Ambystoma opacum*, collected from the vicinity of Pearl River, La. At first sight the flukes appeared to be identical with *B. storeriae*, but on closer examination they were found to represent a new species. The dorsal distribution of the vitellaria suggests the specific designation.

Description.—Body elongated, almost cylindrical, with parallel sides and gently rounded ends; 1.28 mm long by 0.49 mm wide. Cuticle thin, armed anteriorly with very delicate spines as far posterior as middle of posttesticular region of body. Oral sucker subterminal, slightly more muscular than acetabulum, transversely oval, 0.15 mm long by 0.16 mm wide. Acetabulum 0.105 mm long by 0.122 mm wide, about one-third body length (0.423 mm) from anterior end. Ratio of sizes of oral sucker and acetabulum, approximately 3:2. Pharynx muscular, transversely oval, 0.033 mm long by 0.068 mm wide, connected with oral sucker by short prepharynx, surrounded by numerous peripharyngeal gland cells. Esophagus slightly longer than transverse diameter of pharynx, surrounded by periesophageal gland cells. Caeca saclike, rather long, 0.17 mm long by 0.074 mm wide, ending well in front of acetabulum, lined internally with rather low epithelial cells. Ovary almost spherical, 0.091 mm long by 0.10 mm wide, alternating from right to left side of acetabulum, usually about on same level as acetabulum. Oviduct delicate, long. Oötype at about level of equatorial plane of acetabulum. Laurer's canal present. Shell gland surrounding oötype. Receptaculum seminis spherical, large. Uterus a simple tube, descending to near posterior margin of body by a series of transverse loops, ascending by similar course to genital pore; loops almost completely crossing body in posttesticular region of body. Ova 27μ to 30μ by 39μ to 45μ, thick-shelled, operculated, fully embryonated when oviposited. Metraterm weakly developed. Vitellaria sparse, follicles spindle-shaped, widely separated, forming a continuous bridge under dorsal surface just posterior to bifurcation of caeca; vitellaria in lateral fields, extending from anterior margin of ovary on one side and anterior margin of testis on other side to level of bifurcation of caeca. Yolk ducts converging near oötype to form small yolk reservoir. Testes transversely oval, behind level of acetabulum, opposite or slightly in tandem, depending on position of ovary for their exact location (when ovary is right, right testis more posterior); right testis 0.109 mm long by 0.141 mm wide; left testis 0.156 mm long by 0.153 mm wide. Vasa efferentia uniting on entering cirrus sac. Cirrus sac club-shaped, usually forming an inverted U just in front of acetabulum, but sometimes lying dorsal or lateral to acetabulum, rarely extending to posterior margin of sucker, containing spherical vesicula seminalis, bulbous pars prostatica with its gland cells, a short ductus, and a weakly developed cirrus. Excretory system identical with that of other members of the genus, with a flame cell pattern of the 2×6×3 type.

Plagiorchidae

Brachycoelium dorsale Byrd, 1937 cont.

Host.—*Ambystoma opacum* (Gravenhorst).
Habitat.—Small intestine.
Locality.—Pearl River, La.
Type specimen.—U.S.N.M. Helm. Coll. no. 9029.
Remarks.—*Brachycoelium dorsale* appears to be more closely related to *B. storeriae* than to any of the other members of the genus. It is separated from this species by the extent and configuration of the vitellaria, the larger suckers, the larger ovary and testes, and the transverse looping of the uterus. From all other members of the genus thus far mentioned it is separated by the transverse bridge of vitellaria. The position and distribution of the vitellaria, the size and ratio of the suckers, and the uterine pattern serve to separate it from the remaining members of the genus.

2

Proceedings of the
U.S. Nat'l Museum 1937
Vol. 84 No 3010

Plagiorchidae

Brachycoelium elongatum ~~n. sp.~~ Cheng, 1958

Plate 3, fig. 4

The following description is based on eight specimens of the new species. Four of these were recovered from the intestines of the black-bellied salamander, *Desmognathus q. quadrimaculatus* (Holbrook) by Dr. B. D. Reynolds in August, 1939, at Mountain Lake, Virginia; three specimens from the seal salamander, *Desmognathus phoca* (Matthes) by Dr. Reynolds at the same time and same geographic locality; one specimen was recovered from the small intestine of *Plethodon glutinosus* by the author in July, 1955, at the same locality.

The specimens were fixed under slight pressure with Carnoy's (6:1:1) and stained with Harris' Alum Hematoxylin. All of the older specimens had to be restained.

Diagnosis.—(All measurements given in millimeters.) Body slightly dorso-ventrally flattened, narrow and long, 2.24 long (maximum, 3.10; minimum, 1.72), 0.339 wide (maximum, 0.389; minimum, 0.286); the ratio of length to width approximates 11:2. Cuticle spinous in anterior portion of body, becoming less spinous posteriorly, spines ending at posterior level of ovary. Anterior sucker subterminal, 0.127 (maximum, 0.15; minimum, 0.111) by 0.12 (maximum, 0.14; minimum, 0.101). Extremely short prepharynx, invisible in some specimens, 0.002 in mean length; muscular pharynx averaging 0.045 in diameter; long esophagus 0.164 in mean length (maximum, 0.228; minimum, 0.107), bifurcating slightly anterior to midpoint between pharynx and acetabulum. Intestinal ceca elongately bulbous, averaging 0.274 long, parallel to each other, ending in front of level of anterior margin of acetabulum. Subcircular acetabulum, smaller than anterior sucker, situated in anterior half of body, posterior to termination of right cecum, averaging 0.082 x 0.078. Two irregularly oval testes situated in mid-section of body; in all cases left testis posterior to right; left testis 0.159 (maximum, 0.169; minimum, 0.130) by 0.124 (maximum, 0.156; minimum, 0.094), right testis 0.15 (maximum, 0.169; minimum, 0.127) by 0.123 (maximum, 0.146; minimum, 0.098). Respective efferent duct arises from anterior border of each testis and proceeds anteriorly to just posterior to cirrus where the two join to form the short common vas deferens which enters the cirrus sac. Cirrus sac, with average length of 0.132 and average width of 0.042, contains a bilobed seminal vesicle which measures 0.071-0.059 long and 0.049-0.024 wide. Cirrus situated anterior to seminal vesicle averages 0.086 long; it opens in area of genital pore which is immediately anterior to acetabulum. Subspherical ovary, 0.1 (maximum, 0.12; minimum, 0.065) long and 0.088 (maximum, 0.114; minimum, 0.052) wide, situated to the left and posterior to the acetabulum. A short oviduct arises from the medio-lateral margin of ovary and enters into oval oötype; oötype measures 0.016 x 0.013. Amorphic Mehlis' gland, situated immediately posterior to oötype. Laurer's canal present, arising from dorsal surface of oötype. Large compressed seminal receptacle, lying between ovary and cirrus sac, averaging 0.076 long and 0.051 wide. Long transversely convoluted uterine tract, with ascending and descending loops, filled with thick-shelled yellowish-brown eggs, 0.056-0.042 long, 0.033-0.029 wide. Vitellaria follicular, lateral to ceca, extending anteriorly from level of mid-region of ceca posteriorly to level of ovary, joining in area of acetabulum and ovary.

Hosts.—*Desmognathus phoca, Desmognathus q. quadrimaculatus, Plethodon glutinosus.*

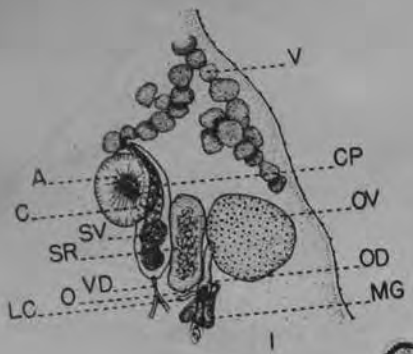
Habitat.—Intestine.

Type locality.—Mountain Lake, Giles County, Virginia.

Type specimen.—USNM Helm. Coll. No. 55608.

Paratype.—USNM Helm. Coll. No. 55607.

The main characteristic which separates this new species from the earlier forms is its striking body length. The body of *B. elongatum* is approximately seven times as long as its width. The second striking characteristic which might be used in differentiating it is the arrangement of the vitellaria. Their anterior limit is the midregion of the ceca; their posterior, the anterior testis. At the posterior level the follicles join dorso-medially in the area just above the anterior testis. These two diagnostic differences easily separate *B. elongatum* from the other species of the genus.



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Ingles (1936) described *Brachycoelium lynchi* from *Rana aurora*. The slide, including the type, designated as USNM No. 8933, held 17 specimens of this species. A critical study of these specimens revealed that Rankin (1938) was correct in transferring this species to another genus; however, the author doubts whether *Lecithodendrium* is the correct one, since from his past experience with this genus, although recognizing the similarity, he is doubtful as to whether *B. lynchi* belongs in this genus, since the characteristic prostate mass of *Lecithodendrium* was not seen in any of the specimens. However, until more work can be done, no change is proposed at this time.

This study of *Brachycoelium* revealed that there are ten valid species including *B. elongatum* belonging to this genus. The paper also points out that some of the characteristics, such as ratio of suckers, position of suckers, size of ceca, and dimension of bodies, used up to now in separating the species, are too flexible to be of any value. The work of Cheng (1956) with *Acanthatrium* (Lecithodendriidae), pointed out a similar situation where sucker and body dimensions, unless radically different, were not reliable in separating the species of *Acanthatrium*. In *Brachycoelium*, the author considers the degree of development and distribution of the vitellaria, and the shape and positions of the testes to be the main diagnostic characteristics.

The following key to the valid species of *Brachycoelium* is based on our present knowledge of the genus, which is entirely morphological. The author realizes that current life-cycle studies, which are being carried on at this laboratory, may reveal the invalidity or validity of other species in the future.

Key to the Genus Brachycoelium

1. Vitellaria lateral to intestinal ceca; not joining on dorso-medial plane.
   - A. Testes situated lateral to and on same level as acetabulum ..... *B. georgianium* Byrd, 1937.
   - B. Testes situated posterior to level of acetabulum.
     - a. Testes situated one posterior to the other ..... *B. mesorchium* Byrd, 1937.
     - b. Esophagus inconspicuous and short ..... *B. obesum* Nicoll, 1914.
     - c. Vitellaria extending posteriorly beyond intestinal ceca ..... *B. salamandrae* (Frolich, 1789).
     - d. Vitellaria not extending beyond intestinal ceca ..... *B. trituri* Holl, 1928.
2. Vitellaria lateral to ceca and also joining on dorso-medial plane.
   - A. Testes on same level as acetabulum.
     - a. Body 0.65-0.95 mm long; vitellaria situated completely anterior to ceca ..... *B. davieri* Harwood, 1932.
     - b. Body 2.04-3.1 mm long; vitellaria extending past tips of ceca ..... *B. louisianae* Byrd, 1937.
   - B. Testes situated posterior to level of acetabulum.
     - a. Esophagus long and slender.
       - i. Body approximately 7 times longer than wide; vitellaria joining only at the level of acetabulum ..... *B. elongatum* n. sp.

Plagiorchidae

synonym of B. salamandrae certain 1938

BRACHYCOELIUM GEORGIANUM, new species Byrd, 1937

PLATE 8, FIGURE 4

Eight specimens of this species of worm were taken from the small intestine of the grass frog (*Rana sphenocephala*) collected from the region about Athens, Ga.

Description.—Body spindle-shaped, bluntly pointed at both ends, or elongated oval with strongly rounded ends; averaging 1.326 mm long by 0.80 mm wide; widest at level of body equator. Cuticle relatively thin, thicker ventrally than dorsally; armed with spines to near posterior margin of body. Oral sucker subterminal, muscular, slightly elongated oval, 0.206 mm long by 0.191 mm wide. Acetabulum transversely oval, measuring only one-half as much as oral sucker, about one-third body length, or 0.474 mm, from anterior body margin. Ratio of sizes of oral sucker and acetabulum, 2:1. Prepharynx short, about 20μ long. Pharynx muscular, transversely oval, 0.055 mm long by 0.087 mm wide, surrounded by gland cells. Esophagus slightly longer than transverse diameter of pharynx, surrounded by gland cells. Caeca saclike, 0.175 mm long by 0.091 mm in greatest width, lined internally by rather tall epithelial cells, ending well in front of acetabulum. Ovary transversely oval, lateral in position, alternating from right to left side of body and varying from a position on level with equatorial plane of acetabulum to a position slightly in front of acetabulum, measuring 0.096 mm long by 0.140 mm wide. Oviduct delicate, arising from medial end of ovary and extending posteromesad for a distance greater than transverse diameter of ovary before forming oötype. Ovarian complex typically that of *B. mesorchium*. Uterus a simple tube descending to near posterior margin of body before returning to genital pore. The entire pattern of the uterus has not been made out because of the numerous dark-brown ova contained in it. Distal end of uterus forming weakly developed metraterm. Ova 27μ to 33μ by 42μ to 45μ, dark brown in color, thick-shelled, operculated, containing fully developed embryos when oviposited. Vitellaria follicular, occupying a position just under dorsal and ventral surfaces of body, lateral to caeca, seldom overlapping caeca except marginally, extending from level of caudal end of caeca to level of equatorial plane of oral sucker. Yolk ducts single in each lateral field, uniting at level of shell gland and forming yolk reservoir. Genital pore ventral, in midline just in front of acetabulum. Testes elongated oval, with margins entire, in lateral fields opposite acetabulum, depending on position of ovary for exact location (when ovary is on right side, right testis is more posterior in position); right testis 0.223 mm long by 0.164 mm wide; left testis 0.241 mm long by 0.166 mm wide. Vasa efferentia uniting on entering cirrus sac. Cirrus sac club-shaped, usually entirely anterior to acetabulum, sometimes extending posteriad around or over acetabulum as far as its posterior margin, containing an almost spherical vesicula seminalis, a short, bulbous pars prostatica surrounded by gland cells, a short ductus ejaculatorius, and a weakly developed cirrus. Excretory system identical with that observed for *B. mesorchium* except anterior end of bladder always observed to end in short, bluntly rounded cornua.

Brachycoelium georgianum Byrd, 1937 cont.

Host.—*Rana sphenocephala* Cope.
Habitat.—Small intestine.
Locality.—Athens, Ga.
Type specimen.—U.S.N.M. Helm. Coll. no. 9030.
Remarks.—*Brachycoelium georgianium* probably shows a closer relationship to *B. mesorchium* than to any of the other members of the genus. It can be distinguished from that species, as well as from *B. hospitale*, *B. obesum*, *B. trituri*, and *B. lynchi*, the other members of the genus with which it might be confused, by the extent and configuration of the vitellaria, the position of the ovary, the size, shape, and position of the testes, the pattern of the uterus, and the general outline of the body.

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Brachycoelium hospitale (Stafford, 1900) Looss, 1902

Length 1.3 to 4 mm. (living) 3 x 0.5 preserved
Width 0.3 to 0.5
Typical 2.25 by 0.5
Shape: long-elliptical or linear with slightly tapering and rounded ends. Oral sucker about 1/3 larger than ventral sucker. Ventral sucker about 1/3 from anterior end. Body smooth and unspined (described as spined in first description). Sucker ratio 4:3

Intestinal system extending 1/4 to 1/3 the length of the worm. Pharynx 0.07 long, 0.065 wide in a 2.25 specimen. Ceca reaching to about level of ventral sucker.

ls - 0.207
as - 0.138

Ovary globular, elliptical, just behind level of ventral sucker to right or to left. Sem.rec. flask shaped, Laurer's canal present. Uterus to posterior end, narrow, eggs in single row.

Testes right and left a little behind level of ovary. slightly obliquely
Cirrus sac small, dorsal to and overlapping the ventral sucker.

Vitellaria of clubshaped follicles arranged longitudinally from level of pharynx to ovary. vitellaria do not meet medianly.

Eggs 45 to 37 μ alive, slightly smaller preserved.

Hosts: Diemyctylus viridescens....spotted newt. - Stafford Canada
Plethodon erythronotus.....red-backed salamander - Stafford Canada

Rana Sphenocephala - (Harwood - 1932) - Texas

Stafford could see no difference from B. salamandrae except size. The two species are very similar. B. salamandrae is larger. Judging from Lühe's figure & Stafford's two figures, B. salamandrae has vitellaria approaching each other medianly, overlapping the ceca medianly, hence occur in broader bands.* Also the tips of one cecum reaches to the ovary (not true in hospitale). The testes seem to be more nearly symmetrical in B. salamandrae.

In B. salamandrae the oral sucker is
1.2 to 1.3 times the ventral sucker.
In B. hospitale the oral sucker is 1.5 times V. sucker

* Hall says that the vitellaria do occur median to the intestinal rami in B. hospitale.

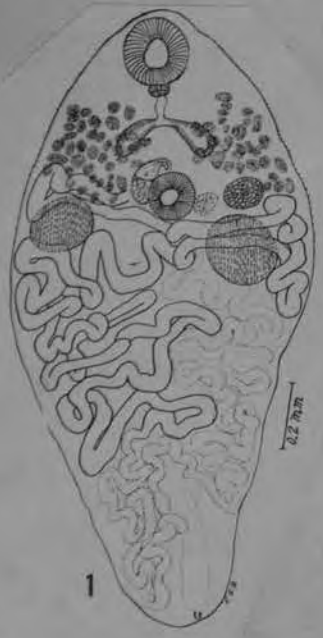
Synonym of B. salamandrae
(Rankin, 1938)

Plagiorchidae

BRACHYCOELIUM HOSPITALE Stafford, 1900

PLATE 8, FIGURE 1

This species of fluke was described by Stafford (1900) from the Canadian salamanders *Triturus viridescens* and *Plethodon erythronotus*. It has been reported recently by Harwood (1932) from the grass frog (*Rana sphenocephala*) from the vicinity of Houston, Tex. I assign to this species eight specimens taken from the duodenum of the salamanders *Ambystoma opacum* and *Plethodon glutinosus*, collected from the vicinity of Pearl River, La. In this material there are certain differences in anatomical details that may be noted. Most of the specimens fall within the range of the smallest forms described by Stafford. The acetabulum is consistently smaller than the figures given by Stafford would indicate, making the size ratio of the oral sucker and acetabulum approximately 8:5. The intestinal caeca terminate anterior to the level of the anterior margin of the acetabulum. The ova seem to be a few microns narrower than the dimensions given in the original description. The testes average about 0.18 mm long and 0.17 mm wide, being thus slightly larger than the ovary, which measures 0.11 mm long and 0.134 mm wide. Stafford states that the testes are slightly larger than the ovary. The cuticle very definitely bears spines as far posterior as the level of the testes.



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Plagiorchidae

synonym of *B. salamandrae* Ran Ranken, 1938

Plagiorchidae

BRACHYCOELIUM LOUISIANAE, n. sp. Byrd, 1937

PLATE 9, FIGURE 3

This species of fluke is represented by five specimens taken from the small intestine of the salamander *Ambystoma opacum*, collected from the vicinity of Pearl River, La.

Description.—Body decidedly elongated, spatulated, being broadly rounded anteriorly and somewhat more pointed posteriorly, 2.04 mm to 3.1 mm long by 0.72 mm wide. Cuticle relatively thin, armed with fine spines anteriorly as far as middle of posttesticular portion of body. Oral sucker subterminal, circular, 0.20 mm in diameter. Acetabulum circular, 0.134 mm in diameter, well forward in anterior third of body, 0.496 mm behind anterior body margin. Ratio of sizes of oral sucker and acetabulum, approximately 3:2. Prepharynx present, short. Pharynx muscular, almost globular, 0.052 mm long by 0.069 mm wide. Esophagus nonmuscular, 0.17 mm long. Caeca flask-shaped, 0.29 mm long by 0.125 mm wide, diverging posterolaterad to end well in front of acetabulum, lined internally by a rather heavy epithelium. Ovary transversely oval, 0.128 mm long by 0.149 mm wide, usually left in position (right in one specimen observed), close behind end of caecum and slightly anterior to level of acetabulum. Oviduct long. Oötype at about level of equator of acetabulum. Laurer's canal, a spherical receptaculum seminis, and shell gland present. Uterus a simple tube, greatly convoluted, descending limb forming transverse and oblique loops to near posterior margin of body, ascending limb forming two or three transverse loops in posterior body, then passing forward by short loops on ovarian side to about middle of posttesticular region, here again forming a series of complete transverse loops before passing to genital pore. Metraterm weakly developed. Ova numerous, thick shelled, operculated, fully embryonated when oviposited, 30μ by 45μ. Vitellaria follicular, dispersed superficially just under dorsal surface, continuous from side to side, extending from level of anterior margin of ovary to posterior boundary of oral sucker, overlapping entire digestive tract. Yolk ducts converging just posterior to oötype, forming a small crescent-shaped yolk reservoir. Genital pore ventral, in midline just in front of acetabulum. Testes rather large, lateral, opposite acetabulum, testis on side of body opposite ovary slightly more advanced; right testis closely apposed to ovary when ovary is right, 0.233 mm long by 0.227 mm wide; left testis closely opposed to ovary when ovary is left, 0.251 mm long by 0.240 mm wide. Vasa efferentia uniting on entering cirrus sac. Cirrus sac fairly large, club-shaped, usually entirely in front of acetabulum, sometimes extending laterad or dorsad to sucker, about one-third longer than diameter of acetabulum, containing a spherical vesicula seminalis, a bulbous pars prostatica with its gland cells, a short ductus, and a weakly developed cirrus. Excretory system of same general pattern observed for *B. mesorchium;* flame cell pattern of the 2×6×3 type.

Host.—*Ambystoma opacum* (Gravenhorst).

Habitat.—Small intestine.

Locality.—Pearl River, La.

Type specimen.—U.S.N.M. Helm. Coll. no. 9027.

Remarks.—*Brachycoelium louisianae* shows a closer relationship to *B. storeriae* and *B. dorsale* than to any other member of the genus. The larger body, suckers, ovary, testes, and cirrus sac, and the distribution of the vitellaria, definitely distinguish it as a separate and distinct species.

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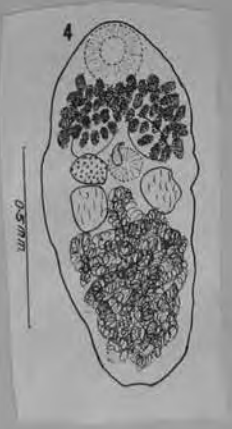
Plagiorchiidae

Plagiorchidae

BRACHYCOELIUM MERIDIONALIS, new species Harwood 1932

PLATE 1, FIGURE 4

Specific diagnosis.—Brachycoelium: A small oval worm, colorless except where the eggs show through. Length 0.8 mm to 0.95 mm, width 0.3 mm to 0.4 mm. The cuticula is thickly studded with small spines in the cephalic regions, but these become sparser caudad. The oral sucker is subterminal and measures about 0.145 mm in diameter. The acetabulum lies near the caudal boundary of the first third of the body and has a diameter varying from 0.125 mm to 0.138 mm. The ratio of the oral sucker to the acetabulum is very close to as 3:2. The pharynx is an oval with the long diameter lying transversely. It measures 38μ by 50μ. The esophagus is about twice as long as the pharynx. In fully matured individuals these two structures are often wholly concealed by the transverse band of vitellaria. The intestinal ceca are short pockets, measuring 85μ by 130μ. The testes are 105μ to 115μ in diameter and are slightly irregular in outline. They lie one on each side of the body, their cephalic margins near the level of the caudal boundary of the acetabulum, but the testis on the ovarian side is slightly posterior to its mate. The genital pore is slightly cephalic to the acetabulum. The cirrus sac, which contains the seminal receptacle, usually resembles the shape of an inverted comma and usually lies partially beneath the acetabulum. The ovary is nearly globular, is lateral in position, and lies at the level of the acetabulum. It measures 76μ to 84μ in diameter. Mehlis's gland lies medio-caudal to the ovary. The vitellaria lie between the middle of the esophagus and the caudal end of the intestinal ceca. Two yolk ducts become visible at the caudo-lateral limits of the vitellarian follicles and extend in a curve from this point to a small yolk reservoir, dorsal to Mehlis's gland. The vitellaria extend from the caudal margin of the oral sucker to the caudal extremities of the intestinal ceca but not beyond. In the dorsal portions of the worm they extend in a continuous band from side to side. The uterus fills the body caudal to the testes. The eggs measure 29μ by 42μ.



Host.—Triturus meridionalis.

Habitat.—Upper intestine.

Locality.—Houston, Tex.

Type specimens.—U.S.N.M. Helm. Coll. No. 30874; paratype, No. 30875.

Synonym of *B. salamandrae* (Rankin, 1938)

Remarks.—The host, *T. meridionalis*, is so closely related to *T. viridescens* that for some time it was considered to be a variety of the latter. A species of *Brachycoelium—B. hospitale* Stafford—has already been described from *T. viridescens* in Canada. A form of *Brachycoelium*, which seems to be identical with *B. hospitale*, has been found several times in specimens of *Rana sphenocephala* captured locally, but oddly enough it was not found in *T. meridionalis*. The situation is further complicated by Holl's species *B. trituri*, from the eastern form of the newt. Doctor Holl kindly loaned me two specimens of *B. trituri* from his private collection. A comparison of this material resulted in the following observations:

B. meridionalis differs from *B. hospitale* and *B. trituri* by having a continuous bridge of vitellarian follicles from one side to the other. It further differs from *B. hospitale* by having larger intestinal ceca, and the vitellaria do not extend so far caudad.

SPECIES INQUIRENDA

BRACHYCOELIUM MERIDIONALIS Harwood, 1932

PLATE 9, FIGURE 5

This species was described by Harwood (1932) from the intestine of the spring lizard (*Triturus meridionalis*) collected from the vicinity of Houston, Tex. Through the courtesy of Dr. Maurice C. Hall, formerly chief of the zoological division, U. S. Bureau of

ency to spread mesad and laterad in the areas of their extent. In the other exception, *B. trituri*, the vitellaria are said to be lateral to the intestinal rami, although nothing is said concerning their dorsal or ventral extension. In the figure accompanying the original description of the species, the vitellaria are represented by about seven follicles in each group. Here again (pl. 8, fig. 5) we see a tendency on the part of these glands to be more numerous than was originally figured and to conform more nearly to the pattern as outlined for the group. These two exceptions, when compared to the other members of the group, in no way alter the rule.

In the second group, containing the species *B. storeriae*, *B. daviesi*, *B. meridionalis*, *B. dorsale*, and *B. louisianae*, the follicles of the vitellaria spread from the superficial mesenchyme just under the ventral surface around the lateral margin of the body to the dorsal surface where they become confluent from side to side, thus forming

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Synonym of *B. salamandrae* Plagiorchidae

Rankin, 1938

BRACHYCOELIUM MESORCHIUM [illegible] Byrd, 1937

PLATE 8, FIGURES 2, 3

More than 30 specimens of this species were taken from the small intestine of the salamander *Desmognathus fuscus fuscus*, collected from the vicinity of Athens, Ga. The specific designation is selected because of the medial position of the testes.

Description.—Body moderately large, elongated elliptical in outline, somewhat cylindrical in transsection; 1.3 mm to 2.7 mm long, averaging 1.7 mm; 0.42 mm to 0.69 mm wide, averaging 0.54 mm; widest at level of acetabulum. Cuticle relatively thin throughout, armed with moderately fine spines anteriorly to level of testes. Oral sucker subterminal, 0.165 mm in diameter. Acetabulum 0.116 mm in diameter, located about one-fourth body length, or 0.45 mm, from anterior end of body. Ratio of sizes of oral sucker and acetabulum, approximately 7:5. Prepharynx present, about 50μ long. Pharynx muscular, 0.04 mm long by 0.07 mm wide, surrounded by numerous rather small peripharyngeal gland cells. Caeca fairly large, 0.21 mm long, 0.09 mm in maximum width, lined internally by a membrane of tall epithelial cells, ending short of level of anterior margin of acetabulum. Ovary alternating from right to left side of midline, always partially dorsal to acetabulum, at level of equatorial plane of acetabulum or slightly in advance of that position, with margin entire, transversely oval, 0.096 mm long by 0.14 mm wide. Oviduct slender, sinuous, arising from medial end of ovary. Oötype at about posterior margin of ovarian side of acetabulum, lined internally by a ciliated membrane. Laurer's canal present. Seminal receptacle flask-shaped. Shell gland rather voluminous, entirely surrounding oötype. Uterus greatly convoluted, descending limb forming half loops on ovarian side, reaching to near posterior margin of body; ascending limb forming half loops in posterior body opposite descending limb, but forming complete loops across body just posterior to testes before passing between testes to make other complete transverse loops in front of testes, then passing to genital pore. Metraterm weakly developed. Ova numerous, thick-shelled, operculated, containing fully matured embryos when oviposited, measuring 27μ to 33μ by 45μ to 52μ. Vitellaria composed of rather large follicles, tending to form two or three clusters on each side of body, lateral in position, extending from level of posterior margin of acetabulum to level of bifurcation of caeca, overlying caeca to near bifurcation. Yolk ducts single on each side, uniting immediately posterior to shell gland and forming a small crescent-shaped yolk reservoir. Genital pore ventral, in midline just in front of acetabulum. Testes transversely oval, margins entire, with inner margins touching or overlapping midline, one slightly in advance of other, depending on position of ovary (right testis posterior in position when ovary is on right side), situated in area just posterior to acetabulum; right testis 0.112 mm long by 0.143 mm wide; left testis 0.104 mm long by 0.153 mm wide. Vasa efferentia delicate, uniting

Brachycoelium mesorchium Byrd, 1937 cont.

on entering cirrus sac. Cirrus sac thin-walled, usually anterior to acetabulum, but sometimes extending posteriad over or around acetabulum to end short of posterior margin of sucker, containing an almost spherical vesicula seminalis, a club-shaped, muscular pars prostatica surrounded by gland cells, a short ductus ejaculatorius, and a weakly developed cirrus. Excretory system (pl. 8, fig. 3) characteristic. Bladder opening through a dorsoterminal pore guarded by a sphincter muscle; main stem of bladder Y-shaped, with short, often indistinct cornua, passing anteriad just under dorsal surface of body, ending near anterior margin of anterior testis. Common collecting tubules relatively long, sinuous, dividing into anterior and posterior collecting tubules and these giving rise to accessory tubules. Flame cells in groups, six groups in each side, each group containing three flame cells. Flame cell pattern of 2×6×3 type.

Host.—*Desmognathus fuscus fuscus* (Rafinesque).

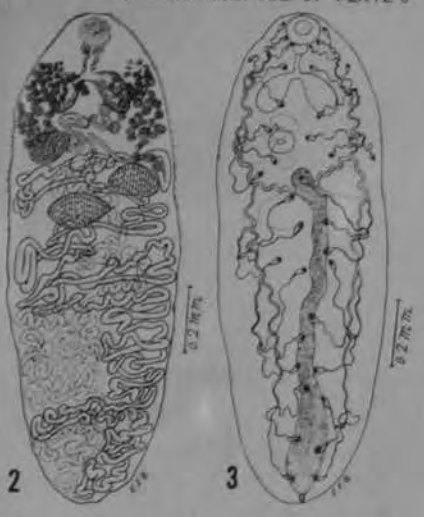
Habitat.—Small intestine.

Locality.—Athens, Ga.

Type specimen.—U.S.N.M. Helm. Coll. no. 9031.

Remarks.—*Brachycoelium mesorchium* shows a close relationship to *B. hospitale* but may be distinguished from that species, as well as from *B. obesum*, *B. trituri*, and *B. lynchi*, the other members of the genus with which it may be confused, by its more nearly equal suckers, the more medial position of the ovary and testes, the configuration and distribution of the vitellaria, and the pattern made by the uterus.

PROCEEDINGS. VOL. 84 PLATE 8



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Brachycoelium obesum Nicoll, 1914

ody (contracted) plump. Size 0.75 to 1.4 by 0.4 to 0.65.
inute spines. Oral sucker 0.17 to 0.25(average 0.22)
entral sucker 0.11 to 0.15 (average 0.135)
ucker ratio 5:3 instead of 5:4 as in B. salamandrae.
entral sucker at about mid-body, 2/5 from anterior end.
harynx 0.075 by 0.07. Ceca extending to middle of ventral
ucker.
irrus sac longer and more slender than in B. salamandrae
extending acrossthe ventral sucker to its posterior border,
containing a large bipartite seminal vesicle.
vary overlapping ventral sucker.
estes postovarian, symmetrical.
itellaria in two seperate groups from middle of ~~ventral~~ oral
ucker to level of ovary.
ggs 50 to 52 by 34 to 36 μ

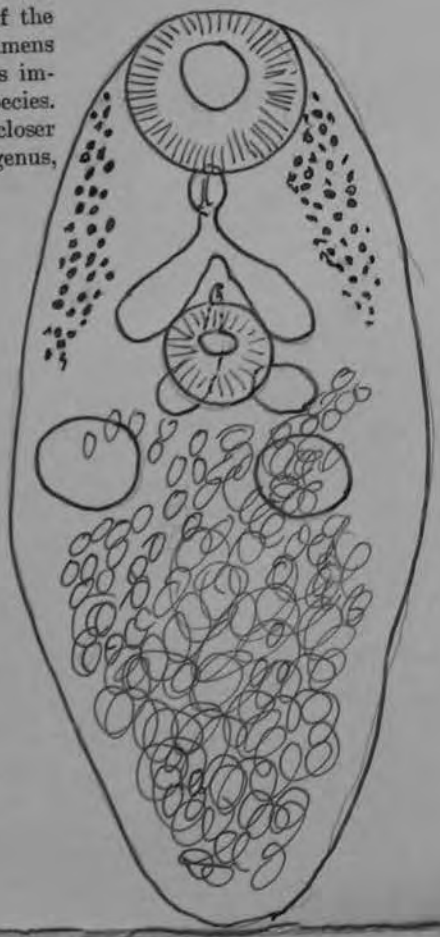
Host: Contia aestiva, summer snake(from North America).
Locality: London Zoo.

Differs from B. salamandrae in sucker ratio; shape of cirrus
sac; egg size; smaller body.
Differs from B. hospitale in larger more unequal suckers;
longer ceca; larger eggs; smaller size.

Proc. Zool. Soc. London 1914, p. 139-154

BRACHYCOELIUM OBESUM Nicoll, 1914

ies of fluke was described by Nicoll (1914) from the
the summer snake (*Contia aestiva*) dying in the London
Gardens. The exact geographical locality from which
me was not given in the author's paper. None of the
erial came from snakes, and since none of the specimens
ose morphological relationship to the species, it is im-
assign any specimens in the collection to this species.
8 specimens in the present collection that show a closer
. *obesum* than to any of the other members of the genus,
e described herein as *B. ovale*.



nonym of B. salamandrae
(Rawson, 1938)

Synonym of *B. salamandrae* Rankin, 1938

Plagiorchidae

BRACHYCOELIUM OVALE, new species—Byrd, 1937

PLATE 9, FIGURE 1

Eighteen specimens of this species were taken from the intestine of the ground skink (*Leiolopisma laterale*) collected from the vicinity of New Orleans and Pearl River, La., and Calhoun Falls, S. C. The oval outline of the body suggests the specific designation.

Description.—Body quite small, elongated cylindrical when extended, almost spherical when contracted, slightly flattened ventrally but strongly arched dorsally; 0.90 mm long when slightly flattened by 0.61 mm wide; widest at level of acetabulum. Cuticle thin, about twice as thick anteriorly as posteriorly, slightly thinner dorsally than ventrally; armed with very fine spines to middle of posttesticular region of body. Oral sucker subterminal, weakly muscular, circular in outline, 0.184 mm in diameter. Acetabulum circular in outline, 0.09 mm in diameter, weakly muscular, lying 0.361 mm behind anterior margin of body. Ratio of sizes of oral sucker and acetabulum, approximately 2:1. Prepharynx long enough to allow transversely oval pharynx, measuring 0.037 mm long by 0.071 mm wide, to lie free behind caudal boundary of oral sucker. Esophagus nonmuscular, 0.07 mm long. Caeca pouchlike, 0.153 mm long by 0.094 mm wide, diverging almost directly laterad, lined internally by a rather low epithelium. Ovary transversely oval, 0.076 mm long by 0.104 mm wide, alternating from right to left side of midline, lateral to and slightly in advance of acetabulum, close behind end of caecum. Oviduct long, extending from inner margin of ovary to near midline at posterior margin of acetabulum before forming oötype. Laurer's canal, receptaculum seminis, and shell gland present. Uterus fairly simple, greatly convoluted, descending to near posterior margin of body by a series of wavy loops on side of body opposite ovary, ascending through a similar course on opposite side of body to region of testes, here making complete transverse loops both posterior and anterior to testes before passing to genital pore. Metraterm weakly developed. Ova thick-shelled, operculated, containing fully developed embryos when oviposited, 27μ to 30μ by 39μ to 45μ. Vitellaria follicular, placed in superficial mesenchyme of lateral and dorsal regions of body, extending from level of anterior margin of ovary to anterior margin of oral sucker, not overlapping caeca. A single yolk duct from each side fusing with its neighbor in region just posterior to acetabulum to form yolk reservoir. Genital pore ventral, in midline just in front of acetabulum. Testes large, equal, 0.145 mm in diameter, at about level of equatorial plane of body, slightly behind level of acetabulum, one slightly in advance of other (when ovary is right, right testis is more posterior), or directly opposite. Vasa efferentia uniting on entering cirrus sac. Cirrus sac club-shaped, reaching to caudal margin of acetabulum, containing vesicula seminalis, pars prostatica with its gland cells, ductus ejaculatorius, and weakly developed cirrus. Excretory system typically that of the genus as described for *B. mesorchium*.

Host.—*Leiolopisma laterale* (Say).

Habitat.—Small intestine.

Localities.—New Orleans and Pearl River, La., and Calhoun Falls, S. C.

Type specimen.—U.S.N.M. Helm. Coll. no. 9028.

Remarks.—*Brachycoelium ovale* perhaps shows a closer relationship to *B. obesum* and *B. lynchi* than to any of the other members of the genus. The smaller size of the suckers, the general size and shape of the body, the smaller ova, the extent and distribution of the vitellaria, and the position and size of the reproductive glands are sufficient to separate it from its nearest relatives.

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Brachycoelium stablefordi n. sp. Cheng & Chase, 1961

BRACHYCOELIDAE JOHNSTON, 1912, EMENDED CHENG, 1958

DESCRIPTION: Body elongate, blunt and broader anteriorly, 0.735–0.99 long, 0.3 wide; cuticle aspinous; oral sucker subterminal, 0.12–0.18 by 0.15–0.2; acetabulum in anterior half of body, 0.077–0.098 in diameter; prepharynx absent, muscular pharynx 0.053 in diameter, esophagus 0.014 long, inconspicuous, (visible only in one specimen); intestinal caeca short and blunt, averaging 0.165 long, lined with single layer of columnar cells, reaching anterior margin of acetabulum; testes subequal, side by side, posterior to acetabulum, left testis 0.082–0.084 by 0.07, right testis 0.09–0.095 by 0.077; cirrus pouch, 0.042 by 0.025, elongate pear-shaped, enclosing bilobed seminal vesicle, cirrus, and prostate glands (Fig. 1b); genital pore immediately anterior to acetabulum, posterior to caecal bifurcation; ovary, 0.109–0.112 by 0.07–0.088, anterior to testes, on same level and to left of acetabulum, partially overlapping it; seminal receptacle, averaging 0.039 by 0.032, immediately posterior to acetabulum on midline of body; vitellaria of large independent follicles, extracaecal,

This research was supported, in part, by grant E-3443 from the Division of Allergy and Infectious Diseases, National Institutes of Health, to the senior author.

Reprinted from TRANSACTIONS OF THE AMERICAN MICROSCOPICAL SOCIETY Vol. LXXX (1): 33-38, January, 1961.

caecal and intercaecal, extending from level of esophagus to posterior margin of acetabulum; uterine coils with intercoiled ascending and descending limbs; excretory vesicle Y-shape. Eggs operculate, 0.042–0.053 by 0.032–0.035.

TYPE HOST: *Dasmognathus f. fuscus* Raf.

HABITAT: Small intestine.

TYPE LOCALITY: Ellicott City, Howard Co., Md.

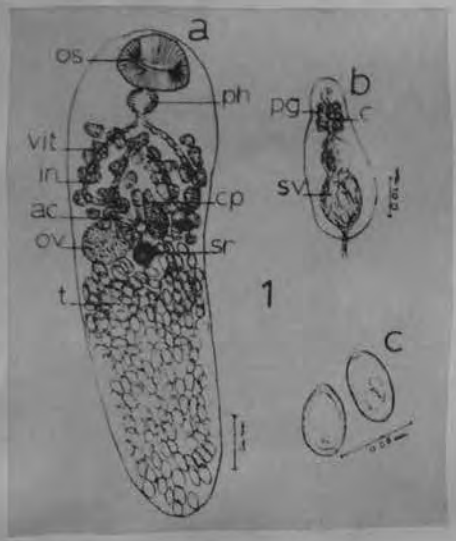
TYPE SPECIMEN: USNM Helminth. Coll. No. 39046.

PARATYPE: JBL Helminth. Coll. No. 101, Department of Biology, Lafayette College.

As noted by Cheng (1958), the members of the genus *Brachycoelium* show a great degree of similarity to one another; however, the differences between the new species and the known species of the genus are definitely distinct and must be considered as reliable specific differences.

Brachycoelium stablefordi can be distinguished from *B. georgianium* Byrd, 1937, *B. mesorchium* Byrd, 1937, *B. salamandrae* (Frölich, 1789), *B. obesum* Nicoll, 1914, and *B. trituri* Holl, 1928 by the position of its vitelline follicles which lie lateral to the intestinal caeca but also converge along the median plane. In the other species listed, the vitelline follicles are limited to the areas lateral to the caeca. The new species can be separated from *B. dariesi* Harwood, 1932 and *B. louisianae* Byrd, 1937 by the position of its testes which are posterior to, rather than being on the same level as the acetabulum. *B. stablefordi* can be distinguished from *B. elongatum* Cheng, 1958 and *B. storeriae* Harwood, 1932 by its short inconspicuous esophagus since in the other two species mentioned, the esophagus is characteristically long and slender (three to five times as long as the pharynx). In addition, *B. stablefordi* is considerably shorter than *B. elongatum* and, unlike *B. storeriae*, possesses an ovary which is larger than the testes.

The new species is most similar to *B. meridionalis* Harwood, 1932. The vitelline follicles of *B. stablefordi*, however, extend from the level of the caecal bifurcation to the level of the acetabulum; hence they are more posteriorly situated than those of *B. meridionalis* which extend from the level of the posterior margin of the anterior sucker to the level of the caecal tips; the caeca terminate anterior to the acetabulum. The acetabulum of *B. stablefordi*, 0.077–0.098 mm. in diameter, is smaller than that of *B. meridionalis*, 0.125–0.135 mm. in diameter, although the body dimensions and oral suckers of the two species are of comparable size. The ovary of *B. meridionalis* is smaller than either of the testes while that of *B. stablefordi* is larger. The cuticle of *B. meridionalis* is distinctly spinous, the testes are irregular in outline, and a prepharynx is present; the cuticle of the new species is definitely aspinous, the testes are regularly rounded, and no prepharynx is present.



Byrd (1937), in giving the generic characteristics, placed a question mark after "spinous cuticula." Cheng (1958) stated that all the specimens he had examined fulfilled the criterion of possessing "cuticle partially spinous in the living state." This question of spinous or aspinous cuticula was raised by Stafford (1903) in his discussion of *B. hospitale* (= *B. salamandrae*). In consideration of the aspinous state of *B. stablefordi*, one must conclude that both spinous and aspinous species exist in the genus *Brachycoelium*.

ABNORMAL TESTICULAR POLYLOBATION IN *Brachycoelium storeriae*

During November, 1959, the junior author collected 18 salamanders, both *Plethodon c. cinereus* Green and *P. g. glutinosus* Green, from the vicinity of Lodi, Bucks County, Pennsylvania. Seven flukes were recovered from the hosts; two from one *P. glutinosus*, one from another, and one each from four specimens of *P. cinereus*. All of these trematodes were identified as *Brachycoelium storeriae* Harwood, 1932. The occurrence of this species in *P. glutinosus* represents a new host record, and the presence of this parasite in the location given represents a new locality record.

One of the two trematodes recovered from the first *P. glutinosus* revealed marked polylobation of both testes. The lobate condition is so severe in the left testis that the organ is in the form of an elongate multilobed structure rather than being rounded as is usually the condition in this species (Figs. 2, 3). The main body of the right testis remained rounded but several smaller lobes can be seen projecting laterally from it and connected to the main lobe by a clearly defined tubule (Fig. 4). Upon examination, after staining with Harris' alum haematoxylin, definite thin hyaline tubules can be seen connecting some of the lobules. Within these tubules spermatozoa are visible. The testicular lobes are arranged randomly at various planes; six constituting the right testis, and at least nine the left. In the right testis, which measures 0.09 by 0.285 mm., the lobes range from 0.028–0.042 mm. by 0.017–0.031 mm., while in the left testis, which measures 0.117 by 0.21 mm., they range from 0.031–0.089 mm. by 0.017–0.062 mm. The testes apparently were functional since distinct meiotic figures as well as mature spermatozoa are visible in all the lobes.

This interesting abnormality is recorded herein since instances of abnormal polylobation of the testes, although known among digenetic trematodes, are not of frequent occurrence, and as far as the authors can determine, none has been reported in the family Brachycoeliidae. Other than this unusual condition, the specimen conforms to the description of *B. storeriae* in the morphology, size and position of all its internal organs, and in the body dimensions. The other specimen from the same host was normal and typical of the species.

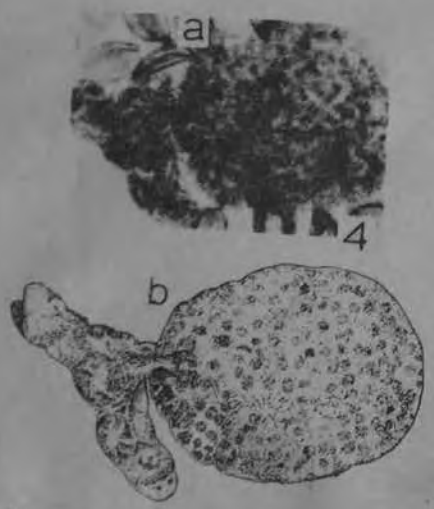


FIG. 4. a. Photomicrograph of right testis of *B. storeriae* showing abnormal polylobation. Taken under 97×.
b. Camera lucida drawing of same region

Plagiorchidae

BRACHYCOELIUM STORERIAE, new species Harwood, 1932

PLATE 1, FIGURE 3

Specific diagnosis.—Brachycoelium: Body length 1.19 mm, width 0.25 mm. The cuticula is thin, and very fine spines are imbedded in it in the region of the oral sucker, but these disappear before the middle of the body is reached. The oral sucker is subterminal and measures 140μ in diameter. The acetabulum measures 84μ by 100μ. The ratio of oral sucker to acetabulum, therefore, approximates 3:2. The anterior margin of the acetabulum is 0.42 mm from the anterior end. It, therefore, lies entirely caudal of the posterior limit of the first third of the body. A very short prepharynx leads to the oval pharynx, which measures 38μ by 46μ. The esophagus is rather long, measuring about 0.126 mm. At its posterior end lie the two short, divergent ceca, which just reach the acetabulum. The ovary lies on the right side of the body at the level of the acetabulum. It is a nearly spherical structure, 70μ in diameter. The rest of the ovarian complex could not be made out with certainty, but it is believed that the ootype and Mehlis's gland lie median and dorsal to the ovary. A structure that appears to be a seminal receptacle lies median to the cephalic margin of the ovary. The exact course of the uterus can not be traced. The eggs lie in the posterior portions of the body, behind the ovary but to some extent overlying the testes. Apparently the uterus passes around the left side of the acetabulum to the median genital pore. The genital pore lies just anterior to the acetabulum. The vitellaria are extensively developed. They extend from a line, the width of the pharynx behind that structure, to the level of the testes. They are within the dorsal portions of the body and occupy the median as well as the lateral fields. The eggs are oval, measuring 50μ by 34μ. The testes are not quite symmetrically placed, the right one being slightly caudal to its mate; they measure about 80μ by 47μ. They are slightly obscured by the eggs ventrad and the vitellaria dorsad. The vasa efferentia could not be traced, but a seminal vesicle appears in the cirrus pouch. The cirrus pouch is a V-shaped structure, with the ventral arm the longer and more distended. It runs cephalo-laterad for a short distance, then loops back in a medio-caudal direction. It ends dorsal to the center of the acetabulum. The excretory system could not be seen.

Host.—Storeria dekayi.

Habitat.—Intestine.

Locality.—Houston, Tex.

Type specimen.—U.S.N.M. Helm. Coll. No. 30873.

Remarks.—This species is easily distinguished from other known species of *Brachycoelium* by the distribution of the vitellaria. Also the acetabulum is more posterior than in most species, but this is a poor character because of the distention of the posterior end by the egg mass in fully matured individuals.

Synonym of
B. salamandrae
(Rankin, 1938)

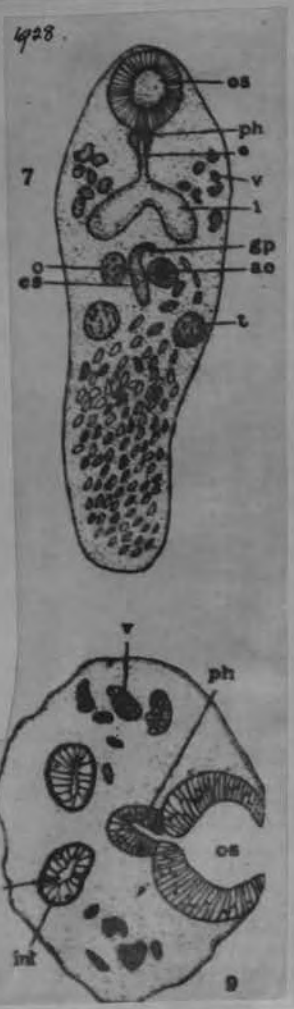
BRACHYCOELIUM STORERIAE Harwood, 1932

This species of fluke was described by Harwood (1932) from a single specimen taken from the intestine of DeKay's snake (*Storeria dekayi*) collected from the vicinity of Houston, Tex., and represents the second species of the genus to be described from snakes. I feel that the species must be considered as valid until more material is available for study. None of the specimens in the present collection can be assigned to this species, although eight of the specimens show a close resemblance to it.

Fig. 7.—*Brachycoelium trituri*, entire specimen flattened. × 105.
Fig. 8.—*Brachycoelium trituri*, cross section through acetabulum and ovary. × 175.
Fig. 9.—*Brachycoelium trituri*, cross section through the oral sucker. × 175.

Brachycoelium trituri Holl, 1928

HOLL, 1928.



Plagiorchidae

Brachycoelium trituri Holl, 1928

Length 1.4, Width 0.442.
Oral sucker 0.167
Ventral sucker near middle of body, [illegible] 0.0836.
Pharynx 0.0418 long and 0.038 wide
Esophagus 0.076 long.
Cirrus sac 0.1336 by 0.0608 to the right of acetabulum.
Ovary to the right of acetabulum.
Follicular vitellaria lateral to esophagus and ceca.
Testes symmetrical just posterior to cirrus sac.
Egg size not given.

Compared with B. hospitale which is from the same host. The only differences noted by Holl are that the ceca are larger and that in B. trituri (12 specimens) the vitellaria are never posterior to the alimentary tract and never median to the rami whereas both occur in B. hospitale

Host: Triturus viridescens
Locality: South Carolina

Ceca shorter than in B. salamandrae or B. hospitale

7

From Holl - 1928
Jour. Helm., 6 : 175-182

BRACHYCOELIUM TRITURI Holl, 1928

PLATE 8, FIGURES 5–7

Brachycoelium trituri was described by Holl (1928) from the intestine of the spotted newt (*Triturus viridescens*) collected at Durham, N. C. The form appears to be a valid species, although Holl's description was too brief to include morphological details, only measurements being given for the various organs. I am able, however, to assign to this species five specimens from the small intestine of the grass frog (*Rana sphenocephala*) collected at Harvey, La., two specimens from the small intestine of *Pseudacris occidentalis* collected at Kenner, La., and five specimens from the small intestine of *Desmognathus fuscus fuscus* collected at Athens, Ga. Certain variations between these specimens and Holl's material should be noted. The body is slightly smaller; the suckers are more nearly equal, their sizes having a ratio of 8:5 rather than 2:1, as in Holl's specimens; acetabulum more cephalic in position; ovary more nearly rounded, slightly smaller; testes slightly larger; vitellaria more extensive. These differences are not deemed distinctive enough for the creation of a new species for the present material. The excretory system (pl. 8, fig. 6) and ovarian complex (pl. 8, fig. 7) are figured in detail for the species in question.

5

6

Synonym of B. salamandrae
(Rankin, 1938)

U. S. NATIONAL MUSEUM 1937
VOL. 84 No. 3013

BRACHYCOELIUM

LOOSE LEAF
ORGANIZER

SCHEDULE

PERIOD OR TIME								
COURSE MON.								
INSTRUCTOR								
COURSE TUE.								
INSTRUCTOR								
COURSE WED.								
INSTRUCTOR								
COURSE THU.								
INSTRUCTOR								
COURSE FRI.								
INSTRUCTOR								
COURSE SAT.								
INSTRUCTOR								

NAME

ADDRESS

SCHOOL TELEPHONE

Cymatocarpus Looss, 1899

Generic diagnosis. — Brachycoeliidae, Brachycoeliinae: Body elongate, moderately stout, spinulate. Acetabulum small, pre-equatorial. Oral sucker and pharynx small. Esophagus long and slender. Ceca very short, widely divergent a short distance anterior to acetabulum. Testes diagonal, postequatorial. Cirrus pouch subcylindrical, curved, extending backward beyond acetabulum, enclosing bipartite seminal vesicle, prostatic complex and thick muscular cirrus. Genital pore wide, a little in front of acetabulum. Ovary submedian, anterior to hind testis. Receptaculum seminis postovarian. Vitellaria forming a longitudinal series of groups of small follicles along each side from level of middle or posterior part of esophagus to ovary or anterior testis. Uterus descending on ovarian side to posterior extremity and then ascending on opposite side, passing between two testes; metraterm strongly developed; eggs small, numerous. Excretory vesicle wide, tubular, reaching to pharynx, giving off a pair of collecting vessels between two testes (Dollfus, 1927). Intestinal parasites of turtles.

Genotype: *C. undulatus* Looss, 1899 (Pl. 46, Fig. 567), in *Thalassochelys undulatus;* Abukir. Metacercaria was found encysted in abdominal muscles of *Pagurus tinctor* — Dollfus (1927).

Other species: *C. solearis* (Braun, 1989) Braun, 1901, in *Chelone mydas;* locality not given.

Brachycoeliidae

Cymatocarpus undulatus Looss

Metacercaria from Pagurus tinctor in Persian Gulf
(from Dollfus,1927)
Final host: Thalassochelys corticata

Caretta caretta

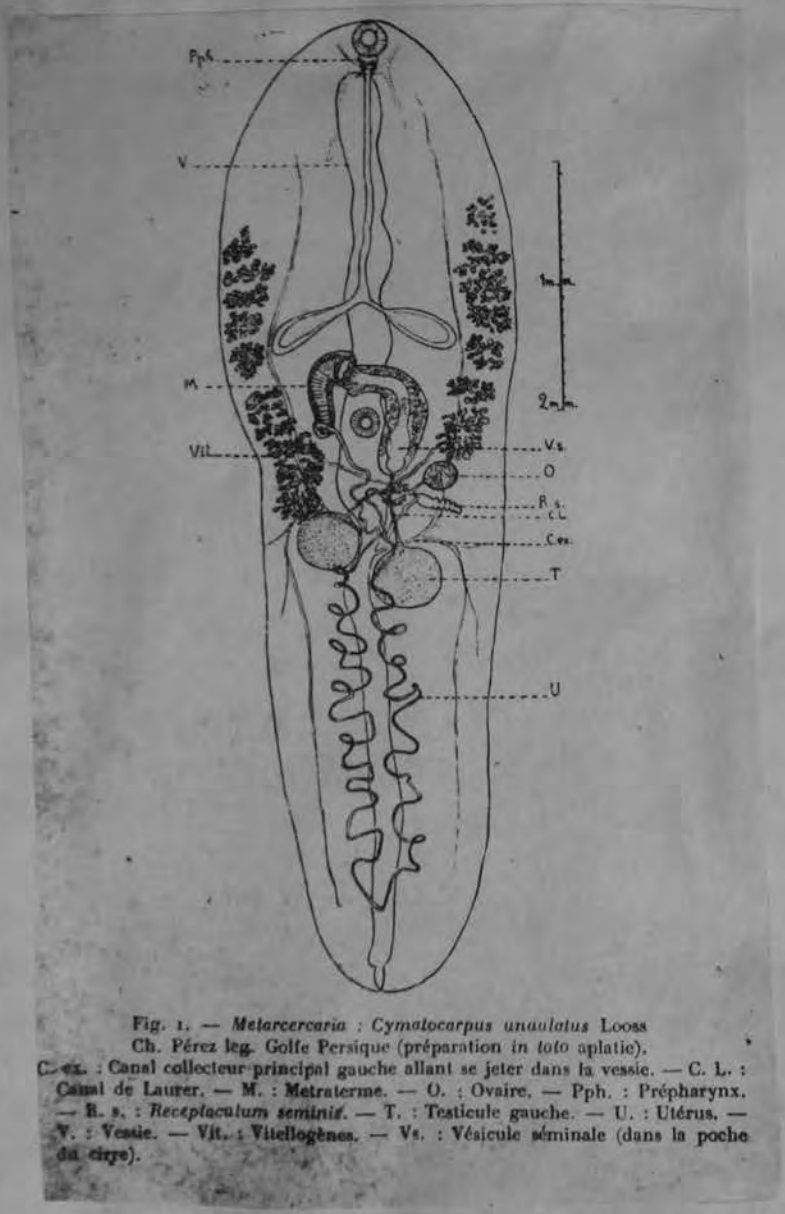


Fig. 1. — *Metacercaria* : *Cymatocarpus unaulatus* Looss
Ch. Pérez leg. Golfe Persique (préparation *in toto* aplatie).
C. ex. : Canal collecteur principal gauche allant se jeter dans la vessie. — C. L. : Canal de Laurer. — M. : Metraterme. — O. : Ovaire. — Pph. : Prépharynx. — R. s. : *Receptaculum seminis*. — T. : Testicule gauche. — U. : Utérus. — V. : Vessie. — Vit. : Vitellogènes. — Vs. : Vésicule séminale (dans la poche du cirre).

Cymatocarpus undulatus Looss

Discovered by Looss (1899, 1901, 1902) in the intestine of Thalassochelys corticata (Rondelet) in Egypt, also at Trieste.

Collected by Linton (1908, 1909, 1910) from the same host (= Caretta caretta) from Tortugas. also recorded by Pratt (1914) from the same region.

One other species in the genus: C. solearis (Braun 1899) from Chelone mydas L.

Systematic position has been considered differently by different authors (cf. Luhe 1900, Pratt, 1902; Odhner 1902, 1910; Stafford, 1903; Travassos 1921; Baer, 1924).

According to Dollfus (1927: 1355) most of these have been deceived by the form of the excretory vesicle which is not Y-shaped as described & figured by Looss; but I-shaped. Cymatocarpus belongs then to the Brachycoeliinae Odhner 1910 sensu.

Dollfus (1927) found the metacercaria almost developed to adulthood in Pagurus tinctor (Forskål) [= varipes Heller] in the Gulf of Persia.

CYMATOCARPUS

Mesocoeliinae Dollfus, 1929

Subfamily diagnosis. — Brachycoeliidae: Body elliptical to lanceolate, spinose. Esophagus short, ceca short or half-long. Acetabulum usually smaller than oral sucker, in anterior third or half of body. Testes symmetrical or not, in acetabular or postacetabular zone. Cirrus pouch between intestinal bifurcation and acetabulum. Genital pore at or near intestinal bifurcation. Ovary submedian, posttesticular. Vitellaria extending largely in anterior half of body. Uterine coils occupying most of hindbody, rarely intruding into forebody. Excretory vesicle tubular, bifurcated anteriorly.

*) Rankin (1937) regarded *B. obscum* Nicoll, 1914; *B. daviesi* Harwood, *B. meridionalis* Harwood, *B. stevensae* Harwood and *B. triluri* Holl, 1928, as synonymous with *B. hospitale* (Stafford), which in turn was synonymized with *B. salamandrae* by the same author in the following year.

Mesocoelium Odhner, 1911

Generic diagnosis. — Brachycoeliidae, Mesocoeliinae: Body elliptical to lanceolate, occasionally broadened posteriorly, spinulate. Oral sucker well developed, pharynx small or moderately large. Esophagus short, ceca short or halflong. Acetabulum usually smaller than oral sucker, in anterior third or half of body. Testes symmetrical or not, intercecal, in acetabular or postacetabular zone. Cirrus pouch postbifurcal. Genital pore at or near intestinal bifurcation. Ovary submedian, posterior to right or left testis. Vitellaria extracecal, chiefly in anterior half of body. Uterine coils occupying most of hindbody, rarely intruding into forebody. Excretory vesicle tubular, divided anteriorly into two short furcae. Intestinal parasites of amphibians and reptiles.

Genotype: *M. sociale* (Lühe, 1901) Odhner, 1911 (Pl. 42, Fig. 517), in *Bufo melanosticius;* India, Burma. Also in *Rana tigrina, Ptyas mucosus;* Burma, India.

Other representatives from amphibians:

M. brevicaecum Ochi, 1930, in *Bufo vulgaris formosus* (*Bufo v. japonicus*); Japan. Experimentally also in *Rana nigromaculata, R. rugosa* and *R. catesbiana*.
Metacercaria encysted in *Euhadra quaesita* — Ochi (1930).

M. burti Fernando, 1933, in *Rhacophorus maculatus;* Ceylon.

M. crossophorum Pérez Vigueras, 1942, in *Bufo peltacephalus;* Cuba.

M. elongatum Goto et Ozaki, 1929, in *Diemyctylus pyrrogaster, Rana rugosa;* Japan.

M. incognitum Travassos, 1921, in *Bufo crucifer, B. marinus.;* Brazil
Also in *B. paracnemis;* Paraguay.

M. japonicum Goto et Ozaki, 1930, syn. of *M. pearsei* Goto et Ozaki, 1930 — Pereira & Cuocolo (1940), in *Polypedates buergeri* from Shikoku and *Pseudosalamandra stejnegeri* from Kyusyu; Japan.

M. lanceatum Goto et Ozaki, 1929, in *Tylotriton andersonii;* Ryukyu.

M. marrsi Fernando 1933, syn. of *M. burti* — Pereira & Cuocolo (1940), in *Rhacophorus eques;* Ceylon.

M. megaloon Johnston, 1912, in *Hyla ewingii oligoon;* Australia.

M. mesembrinum Johnston, 1912, in *Hyla coerulea, H. aurea;* Australia.

M. microon Nicoll, 1914, in *Hyla coerulea, H. gracilenta, Tiliqua scincoides;* Queensland.

M. minutum Park, 1939, in *Bufo vulgaris japonicus;* Korea.

M. monodi Dollfus, 1929, in *Rana mascareniensis* and *Bufo regularis*.
Also in *Chamaeleon, Agama, Lygosoma, Mabuia;* Africa.
Type host and locality: *Chamaeleon gracilis*, Souelaba.

M. oligoon Johnston, 1912, in *Hyla citropus;* Australia.

M. ovatum Goto et Ozaki, 1930, in *Rana rugosa;* Sendai and Komaba, Japan.

M. pearsei Goto et Ozaki, 1930, in *Pseudosalamandra steynegeri;* Kagoshima, Japan.

M. schwetzi Dollfus, 1940, in *Bufo regularis* and *Rana mascareniensis;* Belgian Congo.

M. travassosi Pereira et Cuocolo, 1940, in *Bufo* sp.; Brazil. Also in *Eumeces;* Cuicatlan.

M. waltopi Pereira et Cuocolo, 1940, in *Bufo marinus;* Brazil.

Other representatives from reptiles:

M. americanum Harwood, 1932, in *Eumeces fasciatus, Leiolopisma unicolor,* and *Storeria dekayi;* Texas.

M. brachyenteron Dollfus, 1954, in *Vipera lebetina;* Morocco.

M. brevicaecum Ochi, 1930, in amphibians and *Elaphe quadrivirgata* and *Eumeces latiscutatus;* Asia.

M. carli André, 1915, in *Cinixys belliana;* Africa.

M. danforthi Hoffman, 1935, in *Celestus pleii;* Porto Rico.

M. geomydae Ozaki, 1936, (Pl. 47, Fig. 580), in *Geomyda spengleri;* Japan.

M. gorgesblanci Dollfus, 1954, in *Coelopeltis monspessulana;* Morocco.

M. leiperi Bhalerao, 1936, in *Tropidonotus piscator;* Rangoon. Also in *Eumeces* sp.; Cuicatlan.

M. magrebense Dollfus, 1954, in *Zamenis hippocrepis;* Morocco.

M. maroccanum Dollfus, 1951, in *Chalcides ocellatus;* Morocco.

M. meggitti Bhalerao, 1927, in *Mabuia dissimilis* and *M. multifasciata* Burma, Philippines.

M. microon Nicoll, 1914, in frogs and *Tiliqua scincoides, Hyla caerula, H. gracilenta;* Australia.

M. monodi Dollfus, 1929, in *Chamaeleon gracilis,* Cameroon. Also in *Rana mascarieniensis, Bufo regularis, Agama colonarum* — Szidat (1932).

M. sibynomorphi Ruiz et Leão, 1943, in *Sibynomorphus mikanii;* Brazil.

M. travassosi Pereira et Cuocolo, 1940, in *Bufo* sp. and *Eumeces* sp.; Brazil.

MESOCOELIUM Odhner, 1911

Proc. Linn. Soc. N.S.W., 37:285-362

The following diagnosis is from Johnston, 1912

Small, somewhat oval flukes, more or less spiny, oral sucker the larger, with pharynx, moderately long esophagus, and short intestinal limbs reaching to, or a little beyond, the middle of the body. Excretory vesicle tubular and long, at the anterior end marked off into two very shallow pockets. Testes entire, symmetrically placed on either side of the middle line, near and mostly behind the ventral sucker; ovary entire, in a variable position behind thetestes; seminal vesicle, cirrus sac, prostate and penis moderately developed; genital opening in the middle line, between the suckers; seminal receptacle and Laurer's canal present. Yolk glands a single group of rounded follicles on either side, in the anterior part of the body, not passing inwards beyond the intestinal limbs. Coils of the uterus in transverse loops, filling up most of the body space behind the gonads, only in the terminal part passing in front of these. In the intestine of frogs.

Johnston included this genus in the Brachycoeliinae

Johnston was about to name a new genus for his M. mesembrinum and for Distomum sociale when Odhner's 1910 North African paper appeared naming the neus Mesocoelium for D. sociale. Johnston(p.339) says:

"I cannot agree with Odhner, however, in placing this genus in the subfamily Dicrocoeliinae. For the purpose of comparison, I quote, in parallel columns, on the left and right respectively, Odhner's diagnosis of the subfamilies Dicrocoeliinae and Brachycoeliinae, given on pages 88 and 89 of his work; the words in square brackets are remarks of my own. In the middle column, I give the characters of the same parts in Mesocoelium. A comparison, too, of my own and Luhe's figures of various species of Mesocoelium with Odhner's figure of Brachycoelium crassicolle (p.91) will show the striking resemblance they all bear to one another."

Dicrocoeliinae Lss.	Mesocoelium Odhn.	Brachycoeliinae Odhn. nec Lss.
Spininess of integument generally wanting (Only spiny in Mesocoelium & Hoploderma)	Integument spiny	Integument spiny
Ventral sucker mostly the larger (Not so in Mesocoelium & Hoploderma)	Oral sucker the larger	Oral sucker larger
Limbs of intestine at least 2/3 length of body	Limbs of intestine about ½ length of body	Limbs very short, scarcely reachig beyond ventral suc.
Testes behind or nemt to v.s., symmetrical or obliq.	Testes behind or near v.s., more or less symm.	ditto
Genital pore under fork of intestine	G.p. in front of fork	g.p. just in front of v.s.
Ovary behind testes	Ovary behind testes, variable in position	Ovary in front of testes
Yolk gland reaching behind testes but not in front of V.S.	Chiefly in front of V.S., meeting in middle line near esophagus	Yolk glands up to pharynx, not behind testes, extending toward middle line near esophagus.
In liver & gall bladder of mammals, birds & reptiles (Only Mesocoelium in amphibia)	In intestine of Amphibia	In intestine of Amphibia

Genus Mesocoelium (from Mettrick & Dunkley, 1968)

...matic position of the
...us **Mesocoelium**

Both Cofresi-Sala (1964) and Thomas 1965) have reviewed the systematic position of the genus *Mesocoelium*. While Cofresi-Sala (1964) follows Johnston 1912) and Cheng (1958) in allocating the genus to the family Brachycoeliidae Johnston (1912), he does not give an opinion in which sub-family the genus shold be placed. Thomas (1965) is of the opinion that ,on the basis of adult characters alone, it would seem correct to allocate the genus in the famili Dicrocoeliidae, and also, that the life history of *M. mondi* differs so much from members of the family Dicrocoeliidae that Dollfus (1929, 1933) was justified in removing the genus from the sub-family Dicrocoeliidae, where it had been placed by Odhner (1910. Thomas concluded that, bearing in mind both the close morphological similarities between adult *Mesocoelium* and dicrocoeliids, and the variation found in dicrocoeliid life histories, it was best to retain *Mesocoelium* in the subfamily Mesocoeliinae Dollfus 1929, within the family Dicrocoeliidae.

Both Cheng and Provenza (1960) and Thomas (1965) retain the sub-family Mesocoeliinae as a useful subordinate group, but they differ in which family the group should be assigned. Thus question will not be resolved until further information

is available on the life histories of other species of *Mesocoelium*. It may then be apprent that Dollfus (1933, 1934) as correct in elevating Mesocoeliinae to family rank.

Discussion

As Thomas (1965) pointed out, specific determinations are often extremely difficult, due to intraspecific variation. This is especially true of the genus *Mesocoelium* in which over 30 species have been described (Dollfus, 1954; Cheng, 1960; Capron, Deblock and Brygoo, 1961). The marked morphological similarities between the species in the genus have already been commented on by the above authors. The work of Szidat (1932) and Mettrick (1963) support Stunkard's (1957) view that individuals of the same species may show considerable differences as a result of development in different hosts.

The morphological variations between populations, reported on in this paper, as well as supporting the results from other groups of trematodes, also gives a quantitative assessment of the intraspecific variation to be found in *Mesocoelium danforthi*. This in turn must affect the significance of the characters at present used for intraspecific determination. These fall under four main headings:

a) Differences in the relative size of parts of the body.
b) Differences in the relative position of parts.
c) Size of parts of the body.
d) Presence or absence of minor morphological characters.

Relative Sizes

Cheng (1960) and other authors, have used such characters as relative size of the testes to ventral sucker, and of cirrus pouch to ventral sucker, as intraspecific characters.

Thomas (1965) showed that in *M. monodi*, certain parts show a greater or smaller proportional increase in length than

FAMILY MESOCOELIIDAE

Mesocoelium sociale (Lühe, 1901) Odhner, 1911.

SYNONYMS: *Distomum sociale* Lühe, 1901; *Mesocoelium meggitti* Bhalerao, 1927.

HOST: *Bufo marinus* L. (Bufonidae).

HABITAT: Small intestine.

LOCALITIES: Florida Island, British Solomon Islands; Suva, Viti Levu Island, Fiji Islands.

DATES: 8, 10 November 1944, February 1945 (Florida I.); December 1944, 13 December 1945 (Viti Levu I.).

SPECIMENS: USNM Helm. Coll. no. 61711.

MEASUREMENTS OF SEVEN SPECIMENS (six, Florida I.; one, Viti Levu I.) AND SOME PERTINENT DATA: Body 741–2,395 by 330–1,080; forebody 232–595, hindbody 392–1,585; preoral body 10–46 long, oral sucker 145–290 by 148–287, acetabulum 102–250 by 104–255, sucker length ratio 1:0.69–0.87; prepharynx (in three) 14–41 long; pharynx 58–126 by 63–145; one or both ceca terminating anterior to posterior end of vitelline fields, at same level or postvitellarian; right testis 85–230 by 75–230, left testis 85–215 by 90–206; cirrus sac 87–230 by 38–97, overlapping acetabulum 22–103; posterior chamber of seminal vesicle 31–123 by 21–90, anterior chamber 25–99 by 22–75; genital pore to oral sucker 26–126, to acetabulum 49–138, median to slightly submedian to left, at level of pharynx or esophagus; ovary 92–211 by 104–211, usually dextral but may be sinistral; 28 eggs 29–40 by 20–25.

DISCUSSION: Nine hosts from Florida I. were infected with 2, 3, 7, 8 (in two), 9, 10, 13, and 45 worms, respectively, and two hosts from Viti Levu I. with one and two, respectively. Species of *Mesocoelium* Odhner, 1911, previously reported from *Bufo marinus* are: *M. incognitum* Travassos, 1921, *M. waltoni* Pereira and Cuocolo, 1940, and *M. travassosi* Pereira and Cuocolo, 1940, from Brazil by Pereira and Cuocolo (1940); *M. travassosi* from Costa Rica by Caballero and Brenes (1958); *M. sociale* and *M.* sp. from Colombia by Ucrós (1959); *M. mesembrinum* S. J. Johnston, 1912, from Australia and *M. incognitum* from Hawaii by Yuen (1965).

Freitas (1963) declared *M. sociale* and at least 18 other species of the genus (includes those listed in the preceding paragraph) from a wide variety of amphibians and reptiles from North, Central, and South America, Africa, Asia, and Oceania synonymous with *M. monas* (Rudolphi, 1819) Freitas, 1958, described originally from Brazil. He indicated that the latter species originated on the American continent and expanded to other parts of the world through the transport of its intermediate and definitive hosts. However, at the time of Freitas' paper only the life cycle of *M. brevicaecum* Ochi in Goto and Ozaki, 1929, was known. He considered the latter distinct from *M. monas*.

According to Oliver (1949) the giant neotropical or marine toad, *Bufo marinus*, inhabited the warm subtropical and tropical areas of mainland America from Texas to Argentina. Early in the 19th century it was transported to the West Indies. In 1932 148 adult toads from Puerto Rico were introduced into Hawaii. Subsequently their descendants were introduced throughout the Pacific area as far as Formosa, the Philippines, New Guinea, and Australia. It is possible that some specimens of *M. monas* could have been transported to some of these localities with *B. marinus*, thus supporting Freitas' stated synonymy.

Ochi (1930) reported the land snail *Euhadra quaesita* (Deshayes) from Japan as the intermediate host for *M. brevicaecum*, while Thomas (1965a, b) reported *Lamellaxis gracilis* (Hutton) from Ghana for *M. monodi* Dollfus, 1929. In personal communications Dr. Walter J. Byas, Museum Specialist, Division of Mollusks, U. S. National Museum, stated that *Euhadra* Pilsbry belongs to the family Bradybaenidae, subfamily Bradybaeninae, and *Lamellaxis* Strebel and Pfeffer to the family Subulinidae, subfamily Subulininae; both families are in the suborder Sigmurethra but are not too closely related either by shell characters or anatomy. *E. quaesita* is distributed in China, Japan and Formosa. *L. gracilis* is distributed in the tropics and subtropics of both hemispheres, including South, Central, and North America, West Indies, Africa, Madagascar, Middle East, Indo-Malayan Region, China, Japan, Philippines, Hawaii, and practically all of the island groups of Oceania; it has recently been reported from a greenhouse in Toronto, Canada. Dr. Byas noted that, ". . . some of the Indo-Pacific localities for *L. gracilis* represented in the U. S. National Museum collection are: China, Japan, Ryuku Islands, Singapore, Burma, Thailand, India, Philippines, Andaman Islands, New Caledonia, New Zealand, Loyalty Islands, Mariannas, New Hebrides, Solomon Islands, Society Islands and Cocos Keeling Atoll." He also noted that, ". . . *L. gracilis* was first described by Hutton in 1834 from Mirzapur in the Ganges Valley, India. The oldest recorded specimens in the U. S. National Museum collection do not show dates of collecting, but catalogue entries were made as follows: Singapore (1870?), New

– OVER –

Plagiorchiidae

Zealand (1888), Poona, India (1870), Burma (1894). Specimens were reported under several different names over the same span of years from various localities in Florida, Central and South America and the West Indies which were proven later to be *L. gracilis*." Pilsbry and Bequaert (1927) noted that the latter species [syn. *Opeas gracile* (Hutton)], ". . . is now so well established in the East Indies and in tropical America that it is impossible to decide whether its original home was the Old or the New World." The extensive distribution of this snail, known to serve as an intermediate host for a species of *Mesocoelium* considered synonymous with *M. monas*, tends to support Freitas' synonymy of species.

The information presented above in support of Freitas' synonymy of species with *M. monas* is essentially circumstantial. As we (1965a, b) indicated the answer to the question of species validity must await the elucidation of many more life cycles. Richard (1965) questioned Freitas' synonymy inasmuch as no experimental evidence was presented to show the degree of intraspecific variation. We cannot distinguish our present specimens from those previously identified by us (1964, 1965b) as *M. sociale* from a variety of amphibian and reptile hosts from Palawan I. (Philippines) and North Borneo (Malaysia). Balasingam (1964) reported *M. sociale* (as *M. meggitti*) from *Mabuia multifasciata* (Kuhl) (Scincidae) from Singapore, while Yuen (1965) recovered it from *Bufo melanostictus* Schneider (Bufonidae) from Malaya, Singapore, and Ceylon, and from *Bufo asper* Gravenhorst, *Rana erythraea* (Schlegel), and *R. cancrivora* Gravenhorst (Ranidae) from Malaya; none of these hosts are new but the localities are. Chatterji (1940) declared *M. meggitti* a synonym of *M. sociale*; we (1964) and Yuen (1965) concurred.

FROM FISCHTHAL AND KUNTZ (1967)

Plagiorchidae

Plagiorchiidae

Mesocoelium sociale (Lühe, 1901) Odhner, 1911

SYNONYMS. *Distomum sociale* Lühe, 1901; *Mesocoelium meggitti* Bhalerao, 1927.

HOSTS. *Bufo asper* (Bufonidae); *Kaloula baleata* (Brevicipitidae, syn. Microhylidae); *Rana cancrivora cancrivora*, *R. erythraea* (Ranidae); *Rhacophorus leucomystax* (Ranidae, syn. Rhacophoridae); *Calotes cristatellus* (Agamidae).

HABITAT. Small intestine.

LOCALITIES. Kasiqui (*B. asper*), Jesselton (*K. baleata*, *R. c. cancrivora*, *R. erythraea*), Tanjong aru (*R. c. cancrivora*), Petergas (*R. erythraea*), Penampang (*R. leucomystax*), Tuaran (*R. leucomystax*), Ranau (*C. cristatellus*), North Borneo.

DATES. 29, 30 August (*B. asper*); 6 September and 8, 22 October (*K. baleata*); 17, 30 September (*R. c. cancrivora*); 16, 30 September (*R. erythraea*); 1 September and 13 October (*R. leucomystax*); 18 September (*C. cristatellus*); 1960.

SPECIMENS. U.S.N.M. Helm. Coll. No. 60937 (three slides with one specimen each from *B. asper*); No. 60938 (two slides with one specimen each from *K. baleata*); No. 60939 (two slides with one specimen each from *R. c. cancrivora*); No. 60940 (two slides with one specimen each from *R. erythraea*); No. 60941 (three slides with one specimen each from *R. leucomystax*); No. 60942 (two slides with one specimen each from *C. cristatellus*).

MEASUREMENTS and some pertinent data (based on 32 specimens from two *B. asper*, three measured, 13 from three *K. baleata*, two measured, three from two *R. c. cancrivora*, two measured, five from two *R. erythraea*, two measured, 13 from two *R. leucomystax*, two measured, two from one *C. cristatellus*, both measured). Body 599 to 2,787 by 215 to 955; forebody 195 to 645, hind body 307 to 1,885; preoral body 13 to 16 long; oral sucker 121 to 315 by 126 to 280; acetabulum 97 to 272 by 97 to 275; sucker length ratio 1 : 0.51 to 0.88; prepharynx up to 61 long; pharynx 52 to 123 by 53 to 136; esophagus short; right testis 73 to 202 by 67 to 225; left testis 69 to 213 by 73 to 196; cirrus sac 95 to 250 by 46 to 150, proximal part overlapping anterior portion of acetabulum 27 to 73; seminal vesicle bipartite, posterior chamber 34 to 162 by 36 to 147, anterior chamber 27 to 68 by 27 to 70; prostatic vesicle 15 to 41 by 15 to 34; cirrus (in nine) 28 to 82 by 8 to 13; genital pore median to submedian at pharyngeal level, zero to 80 posterior to oral sucker, 48 to 205 preacetabular; ovary 68 to 235 by 57 to 240, on right or left; uterus ascending on side opposite ovary; metraterm muscular, longer than cirrus sac; 59 operculate eggs measuring 31 to 46 by 19 to 29.

DISCUSSION. We (1964b) reviewed the host and geographical distribution of this species. Again, much morphological variation is evident. In the key given by Cheng (1960) our present specimens, depending upon the position of the genital pore, keyed to either *M. sociale*, *M. meggitti*, or *M. monadi* Dollfus, 1929. In the key given by Freitas (1963) our specimens, with one exception, keyed to *M. monas* (Rudolphi, 1819) Freitas, 1958. The exception from *Calotes cristatellus*, with a sucker length ratio of 1 : 0.51 (1.96 : 1), keyed to a choice between *M. danforthi* Hoffman, 1935, and *M. geoemydae* Ozaki, 1936, but does not fit the descriptions of either; the ratio of the other specimen from *C. cristatellus* is 1 : 0.58 (1.73 : 1). Freitas considered *M. sociale* and at least 18 other species from a wide variety of amphibians and reptiles from North America, Central America, South America, Africa, Asia, and Oceania as synonymous with *M. monas*. Dollfus (1954) questioned the presence of *M. sociale* in South America as its hosts are neither migratory nor transported by man or birds. Contrariwise Freitas stated that *M. monas* originated on the American continent and expanded to other parts of the world through the transport of its intermediate and definitive hosts. While much variation is evident in species of *Mesocoelium* Odhner, 1911, we reiterate our earlier (1965) query as to whether the extensive synonymy expressed by Freitas is entirely valid, it being used solely on morphological characteristics of adult specimens from so many different hosts with a very wide geographical distribution. Again, it appears to us that the question of species validity requires the elucidation of most life histories.

FROM FISCHTHAL AND KUNTZ, 1965

— OVER —

Plagiorchiidae

FAMILY MESOCOELIIDAE

Mesocoelium sociale (Lühe, 1901) Odhner, 1911

SYNONYMS: *Distomum sociale* Lühe, 1901; *Mesocoelium meggitti* Bhalerao, 1927.

HOST: *Bufo bufo asper philippinicus* (Bufonidae).

HABITAT: Small intestine, and rarely in liver.

LOCALITY: Puerto Princesa, Palawan Island, Philippines.

DATES: 21 and 23 May 1962.

SPECIMENS: USNM Helm. Coll. No. 60193 (4 slides with 1 specimen each).

MEASUREMENTS and some pertinent data (based on 26 specimens, 8 measured): Body 2.383 to 2.840 by 913 to 1,135; forebody 598 to 759, hindbody 1,610 to 1,894; preoral body 37 to 85 long; ventral pit opening anterior to oral sucker, extending dorsal to latter; spines usually on anterior body half but may extend to posterior end, very sparse posteriorly, spines on dorsal surface of preoral body but absent laterally and ventrally; oral sucker 224 to 298 by 199 to 265, acetabulum 152 to 224 by 147 to 222, sucker length ratio 1.0:68 to 0.83; prepharynx 18 to 26 long; pharynx 81 to 132 by 88 to 136; esophagus 22 to 81 long; ceca extending posterior to vitellaria; right testis 166 to 250 by 125 to 232, left testis 155 to 232 by 129 to 272; testes usually at acetabular level but anterior in 1 and posterior in 2, usually overlapping only 1 cecum but sometimes both or entirely intercecal; vas deferens usually relatively long, sometimes short; parts of vasa efferentia, their junction, and/or vas deferens may be inflated into small vesicles; cirrus sac 186 to 314 by 74 to 110, posterior end overlapping acetabulum as much as 25 or up to 44 anterior to it; posterior chamber of bipartite internal seminal vesicle 93 to 178 by 63 to 94, anterior chamber 41 to 70 by 38 to 52; prostatic vesicle present, 28 to 43 by 21 to 30; cirrus 32 to 87 by 9 to 15, straight, slightly thick walled and muscular; genital pore median in 3, left of midline in 9, right of midline in 12, usually at pharyngeal level but sometimes just anterior to posterior margin of oral sucker or up to 118 posterior to latter at esophageal level; ovary 155 to 245 by 173 to 265, dextral in 11, sinistral in 13; seminal receptacle 72 to 166 by 77 to 115, anteromedial to ovary, overlapping it dorsally; vitellaria usually interrupted on ovarian side opposite latter and/or testes; metraterm usually straight, 224 to 422 long, usually slightly longer than cirrus sac, commencing at acetabular level, ascending on side opposite ovary; 33 eggs measuring 32 to 37 by 21 to 24.

DISCUSSION: Our partial description provides some previously unrecorded data. Much morphological variation is evident. As *M. sociale* this form has been reported from toads, *Bufo melanostictus* from India (Lühe, 1901; Sewell, 1929), Indonesia (Odhner, 1911), and Burma (Meggitt, 1927; Bhalerao, 1936; Chatterji, 1940), *B. crucifer* from Brazil (Travassos, 1924), and *Bufo* sp. from Paraguay (Odhner, 1911); from frogs, *Rana tigrina* from Burma (Meggitt, 1927; Bhalerao, 1936); and from snakes, *Ptyas mucosus* from Burma (Chatterji, 1940). As *M. meggitti* it has been reported from lizards, *Mabuia dissimilis* from Burma (Bhalerao, 1927; Chatterji, 1940), and *M. multifaveata* from Luzon Island, Philippines (Tubangui, 1931). Chatterji (1940) declared *M. meggitti* a synonym of *M. sociale*; we concur. Dollfus (1954), on the basis of geographical distribution, questioned the presence of *M. sociale* in South America inasmuch as its hosts are neither migratory nor transported by man or birds. Babero and Okpala (1962) in noting considerable morphological variation in *M. monodi* Dollfus, 1929, indicated its probable synonymy with *M. sociale*. It is possible that Dollfus' (1954) arguments also may be applicable in the latter instance. Yamaguti (1958) listed *M. sociale*, *M. meggitti*, and *M. monodi* as distinct species as did Skrjabin and Morozov (1959) and Cheng (1960) in their reviews of *Mesocoelium*. The key given by the latter is unworkable as our specimens, depending on the combination of varying characteristics, could be keyed to *M. sociale*, *M. macrum* Nicoll, 1914, *M. meggitti*, *M. monodi*, *M. americanum* Harwood, 1932, and *M. megalum* Johnston, 1912. Extensive life history studies are necessary to determine the extent of synonymy in *Mesocoelium*.

FROM FISCHTHAL AND KUNTZ (1964)

Plagiorchiidae

Genus MESOCOELIUM Odhner, 1911

This genus is known by many species from Asia, Africa, and Australia, but so far as I am aware there is no previous record from America.

MESOCOELIUM AMERICANUM, new species Harwood, 1932

PLATE 1, FIGURE 2

Specific diagnosis.—Mesocoelium: Body length 1.2 to 2 mm, maximum width 0.5 to 0.7 mm. When properly relaxed before fixing and not flattened, the body is widest in the region of the intestinal fork, rounds anteriorly, and tapers gradually posteriorly. The cuticula is thin, and in the cephalic region it contains numerous short spines. The oral sucker is subterminal and nearly circular in outline. The diameter varies from 0.21 to 0.27 mm. The acetabulum in young specimens lies at the end of the first third of the body, but because of the distention of the posterior region with eggs it is relatively more cephalad in the older specimens. It is 0.13 to 0.2 mm in diameter. The ratio between the acetabulum and the oral sucker varies somewhat, but usually falls between 3:5 and 3:4. The prepharynx is very short and in whole mounts is often obscured. The pharynx is nearly globular and measures 63μ to 105μ in diameter. It is very close to one-half the diameter of the acetabulum. The esophagus is short, seldom equaling the diameter of the pharynx. The ceca curve sharply laterad, then turn caudal and run parallel to the lateral margins. In young specimens they nearly reach the middle of the body, but in fully matured specimens they do not extend far beyond the end of the first third of the body. The genital organs lie close in the fork of the intestine. The ovary is posterior to the testes on the left side, and its cephalic margin nearly always lies anterior to the posterior margin of the acetabulum. It is somewhat irregular in shape but is usually more or less ovoid, with the tip directed medio-caudad. It varies from 0.084 to 0.092 mm to 0.14 by 0.18 mm. The ootype and Mehlis's gland lie medio-caudad of the ovary. On the caudal margin of these structures there is a small yolk reservoir; at this point a seminal receptacle empties and Laurer's canal leaves. The seminal receptacle is a simple sac lying posterior to the yolk reservoir. Laurer's canal runs medio-caudad, loops back on itself, and finally opens on the median, dorsal surface at the level of the yolk reservoir. The extensive coils of the uterus fill the body posterior to the genital field and to some extent invade the genital field itself. In unflattened specimens they usually obscure the ootype and Mehlis's gland and often extend laterad beyond the ceca. The eggs measure 20–31μ by 38–44μ. The vitellaria reach cephalad to the middle of the oral sucker and caudad to the ends of the ceca. They only slightly overlap the ceca and are mostly lateral to them. In the esophageal region the vitellarian fields widen considerably. The testes lie anterior to the ovary, but only slightly so. The testis of the ovarian side is the more anterior of the two. They are somewhat irregular in shape, apparently because of pressure from the intestinal ceca, the acetabulum, and the female genital system. They are of approximately equal size and vary from 0.07 by 0.105 mm to 0.14 by 0.15 mm. The vasa efferentia leave from the medio-cephalic corners and extend to the seminal vesicle in the cirrus sac. The cirrus sac is about 0.15 mm long and runs caudad from the genital pore, which is median and lies in the region of the intestinal fork. A pars prostatica is present. The simple capillary excretory vesicle extends from the terminal excretory pore to a point slightly behind the seminal receptacle.

Hosts.—Storeria dekayi, Leiolopisma laterale, and *Eumeces fasciatus.*

Habitat.—Intestine.

Locality.—Houston, Tex.

Type specimens.—U.S.N.M. Helm. Coll. No. 30868; paratype, No. 30869.

Remarks.—This species is very similar to *Mesocoelium microon* Nicoll (1914a) from Australian anurans. The chief difference is that the esophagus is never longer than the pharynx in the present species, while it is twice as long in the Australian form. The testes are smaller relative to the acetabulum, and the ovary appears to be slightly more anterior relative to this organ. The suckers, pharynx, and eggs seem to be a little larger in my species than in Nicoll's.

The record for *Eumeces fasciatus* is based on a single individual, which is so young that there is no indication of either eggs or vitellaria. The ovaries and testes, however, are well developed and occupy the same position relative to each other and to the acetabulum. The ratios between pharynx, acetabulum, and oral sucker are identical with those for the mature specimens of *Mesocoelium americanum.* In the specimen from *Eumeces fasciatus,* however, the acetabulum is relatively farther posterior, being near the middle of the body, and the intestinal ceca are distinctly longer when compared with the length of the body.

Mesocoelium brieni Vercammen-Grandjean, 1960

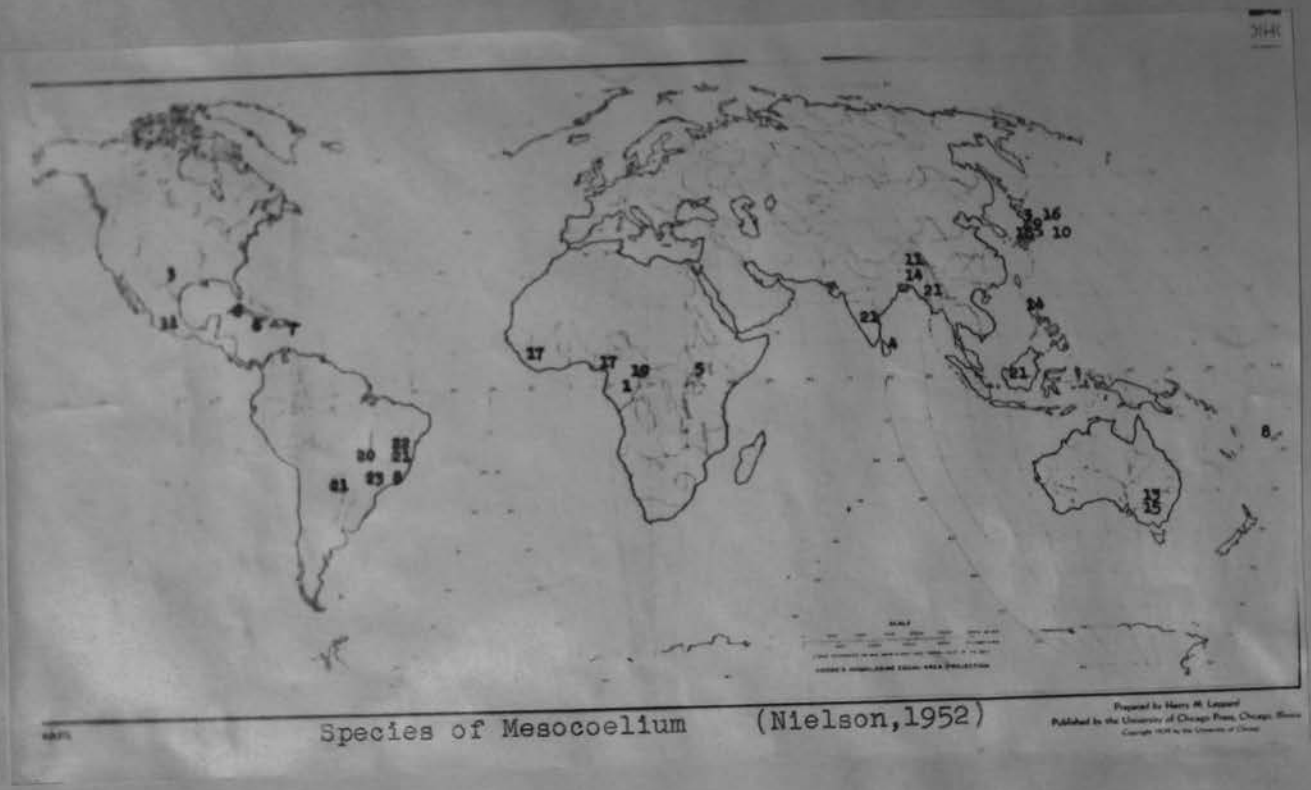
Mesocoelium brieni Vercammen-Grandjean, 1960: 49, 104, 106, 107, 169 pl. XXIX, figs. 198-200

Habitat — Intestino delgano de **Mochlus fernandi.**
Distribuição geográfica — Congo (Bukavu).
Tipo — ?

Descrita de 15 espécimes, com os seguintes caracteres: Corpo com 0,75 a 1,00 mm de comprimento por 0,366 a 0,510 mm de largura; cuticula espinhosa; espinhos dispostos como em **M. buttnerae**; ventosa oral com 0,188 a 0.230 mm de comprimento por 0,188 a 0,215 mm de largura; acetábulo central, com 0,100 a 0,130 mm de diâmetro; prefaringe curta; faringe bem musculosa, com 0,050 a0,076 mm de comprimento por 0,056 a 0,079 mm de largura; cecos intestinais curtos e volumosos, terminando ao nível dos vitelodutos; aparelhos genitais de acôrdo com a disposição nabitual no gênero e semelhantes aos de **M. buttnerae** e **M. caparti**; bôlsa do cirro muito nítida, com 0,094 a 0,122 mm de comprimento por 0,037 a 0,044 mm de largura; testículo do campo ovariano com 0,060 a 0,114 mm de comprimento por 0,050 a 0,068 mm de largura; testículo oposto com 0,060 a 0,088 mm por 0,051 a 0,078 mm; ovário com 0,076 a 0,114 mm de comprimento por 0,051 a 0,070 mm; espermateca com 0,038 a 0,040 mm por 0,024 a 0,036 mm; ovos operculados, com 0,036 a 0,038 mm de comprimento por 0,027 a 0,028 mm de largura; vitelinos constituidos por folículos que terminam ao nível dos cecos intestinais; vesícula excretora esférica.

Essa espécie é indistinguível de **M. monas** (Rudolphi, 1819), devendo ser considerada seu sinônimo.

J. F. Teixeira de Freitas, 1967



Species of Mesocoelium (Nielson,1952)

MESOCOELIUM BURDWANENSIS ~~n.sp.~~ MUKHERJEE, 1967
(Fig. 1.)

The worm is elongated with rounded ends and without cuticular spines. The anterior end is slightly broader than the posterior one. It measures 1.845×0.450 mm. Subterminal mouth is surrounded by a well developed muscular oral sucker measuring 0.270×0.234 mm. Oral sucker followed by a muscular pharynx measuring 0.054×0.072 mm. Small oesophagus measures 0.045 mm. in length. It bifurcates into two very small intestinal caeca extending laterally and posteriorly almost in front of ventral sucker. The muscular ventral sucker is circular and measures 0.261 mm. in diameter.

The two well developed, extra-caecal and symmetrical testes are situated on the two sides of the ventral sucker. The left testis is situated slightly in advance of the right and measures 0.153×0.162 mm. The right testis is slightly longer than the left and measures 0.189×0.135 mm. The vasa efferentia arise from the anterior ends of the testes and finally meet in the centre to form a short vas deferens, which pierces the cirrus sac at the posterior end. The cirrus sac is large well developed, intercaecal, situated anterior to ventral sucker, almost round in shape and measures 0.162×0.153 mm. The genital pore is post-bifurcal and situated in the middle line of body. The small and almost round ovary measures 0.072 mm. in diameter. It is situated behind the right testis. Situated on one side of the ovary is the round receptaculum seminis. The major portion of the uterine coils lie posterior to the ovary and are packed with eggs. The anterior part of the uterus passes to the ventral side of the cirrus pouch and opens to the exterior by means of the genital pore. The vitellaria are large round to oblong follicles, few in numbers and extend laterally almost from the anterior level of pharynx to the caecal ends. They are mostly extra-caecal but at places they also overlap the caeca. The two stout vitelline ducts arise on either side from the posterior ends of the vitelline follicles and extend posteriorly. The eggs measure 0.264-0.288×0.014-0.017 mm.

MESOCOELIUM BURDWANENSIS, N.SP.

Comparing with the so far known species of the genus *Mesocoelium* Odhner (1911) it is found that the present form agrees best with the species *M. elongatum* Goto and Ozaki (1929) in extension and caecal length, arrangement of testes and extension of vitelline follicles, however, it differs from the known species in absence of cuticular spines, position of ovary, number and arrangement of vitelline follicles and size and structure of the cirrus pouch. So it is considered as a new species and the name *Mesocoelium burdwanensis* is proposed.

Host: *Calotes versicolor*. 1 SPECIMEN
Location: Intestine.
Locality: Burdwan (West Bengal).

Type: Holotype (No. W 6729/1—on slide) has been deposited in the National Zoological Collections at the Zoological Survey of India, Calcutta.

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Mesocoelium buttnerae Vercammen-Grandjean, 1960

Mesocoelium buttnerae Vercammen — Grandjean, 1960: 89, 104-106, 169, pl. XXVIII, figs. 189-197

Mesocoelium buttneri Vercammen — Grandjean, 1960 104 (sic)

Habitat — Intestino delgado de **Ptychadena** sp.

Distribuição geográfica — Congo (rio Nyakabera, Bukavu).

Tipo — ?

Descrita de 7 espécimes adultos e 1 jovem (de 8 jovens coletados), com os seguintes caracteres naqueles:

Corpo bastante alongado, com 1,14 a 2,68 mm de comprimento por 0,44 a 0,928 mm de largura; cutícula espinhosa; espinhos esparsos ao nível da extremidade dos cecos intestinais e ausentes na porção mais posterior do corpo; ventosa oral com 0,20 a 0,356 mm de de comprimento por 0,22 a 0,308 mm de largura; acetábulo no têrço anterior do corpo, com 0,126 a 0,208 mm de diâmetro; préfaringe curta; faringe musculosa, com 0,07 a 0,109 mm de diâmetro; esôfago nulo; cecos intestinais dilatados; bôlsa do cirro como em **M. brieni**, com 0,100 a 0,178 mm de comprimento por 0,038 a 0,069 mm de largura; testículo do campo ovariano na zona da bôlsa do cirro, com 0,099 a 0,172 mm de comprimento por 0,074 a 0,157 mm de largura; testículo oposto com 0,096 a 0,172 mm por 0,074 a 0,143 mm; ovário com 0,143 a 0,235 mm de comprimento por 0,098 a 0,186 mm de largura; espermateca com 0,038 a 0,118 mm de comprimento por 0,034 a 0,074 de largura; canal de Laurer presente; ovos ligeiramente pontudos na base, com 0,035 a 0,040 mm de comprimento por 0,021 a 0,022 mm de largura; vitelinos constituidos por folículos que se estendem desde um pouco atrás da ventosa oral até a altura dos vitelodutos; vesícula excretora em Y.

Vercammen-Grandjean diz: Il est manifeste que **Mesocoelium schwetzi** R. Ph. Dollfus 1950, est composé de deux espéces différentes correspondant d'ailleurs à deux hôtes différents. Les spécimens trouvés dans **Ptychadena** sp. correspondent à la description donnée par Dollfus pour l'espèce provenant de **Rana mascareniensis** originaire de Bukama (Lot n. 23.220): Le type de **Mesocoelium schwetzi** fait partie d'un lot de 4 **Bufo regularis**. En conséquence, les spécimens provenant de **Rana mascareniensis** sont rangés sous le nom de **Mesocoelium buttnerae**.

Julgamos **M. buttnerae** indistinguível de **M. monas** (Rudolphi, 1819) devendo, portanto, ser incluida em sua sinonimia.

J.F. Teixeira de Freitas, 1967

Mesocoelium cameroonensis n. sp. SAOUD, 1964

A total of ten specimens were found in the collection from *Rana* (*Ptychadena*) *oxyrhynchus*. They had been collected from the small intestine and fixed in 10% formalin. Examination revealed that they belong to a hitherto undescribed species of the genus *Mesocoelium* which is described here as *M. cameroonensis* after the locality of the host.

Description : The body is small, oval measuring 0·416 mm.–0·640 mm. in length with a maximum breadth of 0·256 mm.–0·362 mm., attained at the posterior third of the body. In fully relaxed specimens, the body is attenuated at both extremities. The anterior half of the body is covered throughout with minute, backwardly directed spines which are very numerous at the anterior extremity and become less numerous posteriorly. There are hardly any spines in the region of the body posterior to the gonads. The oral sucker is subterminal and relatively large, measuring 0·164 mm. –0·175 mm. × 0·149 mm. The acetabulum is smaller than the oral sucker measuring 0·08 mm.–0·095 mm. × 0·069 mm.–0·083 mm. It lies in the middle third of the body. The distance between the posterior border of the oral sucker to the anterior border of the acetabulum is about 0·063 mm. The ratio between the measurements of the oral sucker to the acetabulum is about 1·83 : 1. A well developed muscular pharynx 0·051 mm. × 0·037 mm., is present immediately posterior to the oral sucker. No prepharynx nor oesophagus was observed in any of the available specimens; the two intestinal caeca arise immediately posterior to the pharynx. These caeca are fairly long and thick walled and extend posteriorly to reach the posterior third of the body.

Two large, oval and nearly symmetrical testes are situated one on each side of the body in the acetabular region. They have a smooth outline. Usually the left testis (the one anterior to the ovary) is slightly anterior to the right one. The cirrus pouch is very small, situated anterior to the left testis with its anterior part lateral to the pharynx. It opens medially on the posterior border of the oral sucker, very close to the anterior margin of the pharynx. It measures 0·054 mm. 0·063 mm. × 0·24 mm.–0·030 mm. Apart from the seminal vesicle none of the internal structures could be traced in the cirrus pouch.

The ovary is generally oval, sometimes pear shaped with a smooth outline. It lies posterior to the left testis and postero-lateral to the acetabulum being usually in the middle third of the body. It is always smaller than the testes measuring 0·08 mm. 0·09 mm. × 0·05 mm. 0·06 mm. Neither a receptaculum seminis nor Mehlis' gland could be seen in any of the specimens. The uterus is large, occupying the posterior third of the body. It extends anteriorly ventral to the testis and opens together with the cirrus pouch at the genital pore which lies immediately anterior to the pharynx. The follicular vitellaria extend along the lateral fields from the level of the oral sucker anteriorly to the end of the intestinal caeca posteriorly, being always more numerous in the anterior third of the body. Sometimes they extend only slightly posterior to the ends of the caeca and close to the posterior end of the body. The eggs are small and oval measuring about 32·8–33·6 μ × 18·3–21·9 μ.

The excretory system could not be studied in any of the available specimens.

Host : *Rana* (*Ptychadena*) *oxyrhynchus*.

Locality : Kumba, Cameroons, West Africa.

Location : Small intestine.

Type : Department of Parasitology, London School of Hygiene and Tropical Medicine.

-ov

Affinities : It is clear from the above description that ***Mesocoelium cameroonensis*** sp. nov. resembles to some extent *M. pesteri* sp. nov. which has been described in the present paper from the hornless chamaeleon in the same locality. The main difference between the two species lies in the extent of the intestinal caeca in relation to the body ; they are short, never extending posterior to the middle of the body in *M. pesteri* and fairly long, extending posteriorly to reach the distal third of the body in *M. cameroonensis*. The topography of the gonads is also different in the two species. Another difference between them is in the ratios between the two suckers which are 1·83 : 1 in *M. cameroonensis* and 1·44 : 1 in *M. pesteri*.

M. cameroonensis also resembles to some extent *M. schoetzi* Dollfus, 1950 but they can be differentiated by the ratios between the suckers, the measurements of the body, pharynx and cirrus pouch. The posterior distribution of the vitellaria in *M. cameroonensis* is another distinguishing character. The eggs of *M. cameroonensis* are also smaller than those of *M. schoetzi*.

The distribution of the vitellaria, never extending anterior the level of the intestinal bifurcation in both of *M. maroccanum* Dollfus, 1951 and *M. georgeshlanci* Dollfus, 1954 distinguishes them from *M. cameroonensis* sp. nov.

Although the distribution of the vitellaria and the extent of the development of the intestinal caeca are similar in *M. cameroonensis* sp. nov. and *M. monodi* Dollfus, 1929, yet these species can be differentiated by the ratios of the two suckers, the topography of the genital organs and the extent of the development of the spines on the body of both species. The cirrus pouch of *M. cameroonensis* is also much smaller than that of *M. monodi*. The position of the genital pore also differentiates the two species ; it is immediately anterior to the pharynx in *M. cameroonensis* whereas usually it lies at the intestinal bifurcation in *M. monodi*.

The absence of cuticular spines on the body of *M. carli* André, 1915 readily differentiates it from *M. cameroonensis*.

The very small cirrus pouch of *M. cameroonensis* sp. nov. mainly differentiates it from *M. brieni* Vercammen-Grandjean, 1960, *M. caparti* Vercammen-Grandjean, 1960 and *M. bulternae* Vercammen Grandjean, 1960.

M. cameroonensis sp. nov. can be differentiated from *M. minutum* Parker, 1939 by the length of the intestinal caeca, being fairly long in the former and short in the latter. The distribution of the vitellaria and the ratios of the suckers are also different in both species.

It can also be differentiated from *M. leiperi* Bhalerao, 1936 by the ratios of the two suckers, the position of the genital pore, the measurements of the body and the cirrus pouch. On nearly similar grounds it can be differentiated from *M. travassosi* Pereira *et al.*, 1940 and *M. sociale* (Lühe, 1901) Odhner, 1910.

The distribution of the vitellaria readily distinguishes between *M. mesembrinum* Johnston, 1912, *M. microon* Nicoll, 1914 and *M. monas* (Rudolphi, 1819) Freitas, 1958 on one hand and *M. cameroonensis* on the other hand. The extent of the development of the intestinal caeca together with the topography of the gonads in relation to the acetabulum, differentiate *M. cameroonensis* sp. nov. from *M. microon* Johnston, 1912. The presence of cuticular spines as well as the ratio between the oral sucker and the acetabulum readily differentiate *M. cameroonensis* and *M. marrsi* Fernando, 1933. The absence of a prepharynx, the position of the genital pore as well as the geographical distribution differentiate *M. cameroonensis* sp. nov. and *M. burti* Fernando, 1933.

Mesocoelium cameroonensis Saoud. 1964: 291, 297-300, fig. 2

Habitat — Intestino delgado de **Rana (Ptychadena) oxyrhynchus**.

Distribuição geográfica — Camerum (Kumba).

Tipo — Depositado no Departament of Parasitology, London School of Hygiene and Tropical Medicine.

Descrita de 10 exemplares (provàvelmente não comprimidos), com os seguintes caracteres:

Corpo oval, com 0,416 a 0,640 mm de comprimento por 0,256 a 0,362 mm de largura; extremidades atenuadas; cutícula espinhosa; espinhos mais densos anteriormente; ventosa oral subterminal, com 0,164 a 0,175 mm de comprimento por 0,149 mm de largura; acetábulo no têrço médio do corpo, com 0,08 a 0,095 mm de comprimento por 0,069 a 0,083 mm de largura; relação entre as ventosas é de 1,831:1; préfaringe não observada; faringe musculosa, com 0,051 mm de comprimento por 0,037 mm de largura; esófago não observado; cecos intestinais atingindo o têrço posterior do corpo; poro genital mediano, ao nível do bordo posterior da ventosa oral; bôlsa do cirro com 0,054 a 0,063 mm de comprimento por 0,024 a 0,030 mm de largura, em parte na zona faringeana, contendo vesícula seminal; testículos quase simétricos, na zona acetabular, lisos; ovário ovóide, às vêzes piriforme, pós-acetabular e atrás de um dos testículos, com 0,08 a 0,09 mm de comprimento por 0,05 a 0,06 mm de largura; espermateca e glândula de Mehlis não observadas; útero ocupando o têrço posterior do corpo; ovos com 0,033 a 0,034 mm de comprimento por 0,018 a 0,022 mm de largura; vitelinos com folículos que se estendem da zona da ventosa oral até a terminação dos cecos intestinais; vesícula excretora não evidenciada.

Espécie indistinguível de **M. monas** (Rudolphi, 1819); deve ser incluída em sua sinonímia.

J. F. Teixeira de Freitas

Mesocoelium carli André, 1915

Host: *Cinixys erosa* (Schweigger, 1814)

Loc.: Belgian Congo

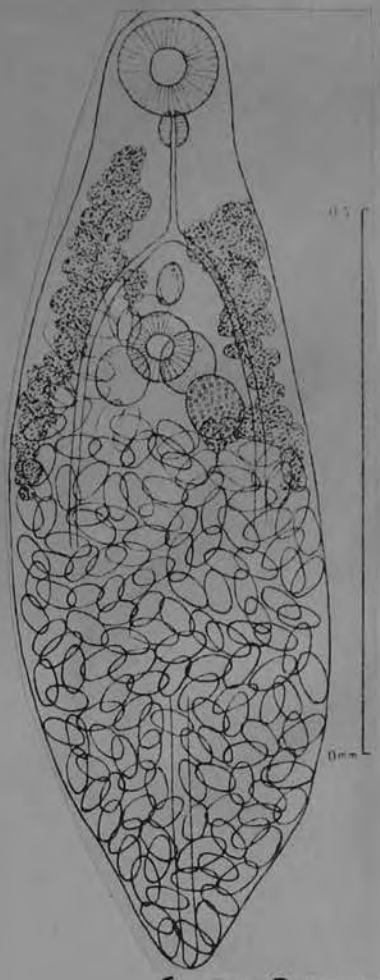


FIG. FROM DOLLFUS, 1950

Mesocoelium caparti Vercammen- Grandjean, 1960

Mesocoelium caparti Vercammen-Grandjean, 1960: 49. 104, 105, 106-107, 169, pl. XXX, figs. 201-205

Habitat — Intestino delgado de **Varanus niloticus.**

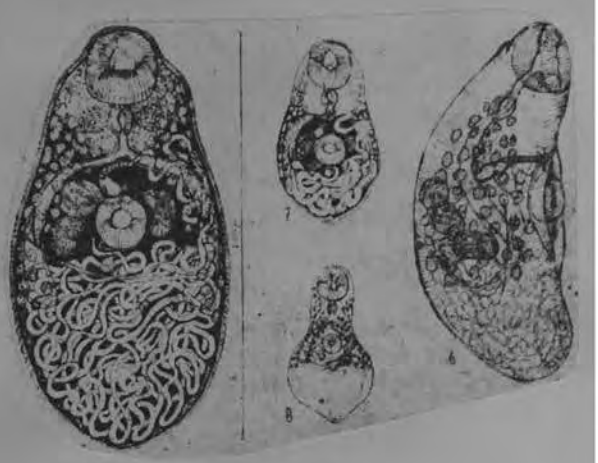
Distribuição geográfica — Congo (rio Ruzizi, Luvungi).

Tipo — ?

Descrita de 43 exemplares, com os seguintes caracteres:

Corpo às vêzes com a forma de cabaça, com 0,52 a 0,96 mm de comprimento por 0.358 a 0,536 mm de largura; cutícula espinhosa; espinhos como em **M. buttnerae** e **M. brieni**; ventosa oral com 0,140 a 0,188 mm de diâmetro; acetábulo com 0.100 a 0,116 mm de diâmetro; prefaringe curta; esôfago estreito e curto; cecos intestinais muito espessos nas extremidades, que se situam no têrço posterior do corpo; bôlsa do cirro com 0.110 a 0.340 mm de comprimento por 0,034 a 0.072 mm de largura; testículo do campo ovariano com 0,085 a 0,110 mm de comprimento por 0.051 a 0.094 mm de largura; testículo oposto, reniforme, com 0,076 a 0.106 mm por 0.042 a 0.080 mm; ovário em forma de corno, com 0,230 a 0.470 mm de comprimento por 0,055 a 0.076 mm de largura; espermateca com 0.015 a 0.035 mm por 0.015 a 0,032 mm; glândula de Mehlis e canal de Laurer presentes; ovos com 0,040 a 0,042 mm de comprimento por 0,021 a 0.024 mm de largura; folículos vitelinos menores e menos numerosos que em **M. brieni**; vesícula excretora alongada.

Essa espécie é, também, indistinguível de **M. monas** (Rudolphi, 1919), devendo, assim, ser considerada seu sinônimo.



J.F. Teixeira de Freitas, 1967

Plagiorchidae
Mesocoeliinae

From Barus & Moravec, 1967:

1. *Mesocoelium crossophorum* Pérez Vigueras, 1942 (Fig. 1)

Host: *Bufo insulsus* (Bufonidae, Ecaudata) — a new host.
Location: small intestine.
Locality: Havana—Matanzas (Provinces Havana).
Of the 12 examined *B. insulsus*, this species was found in 2, one to two specimens in each host.

Description: Trematodes of medium size. The body oval, broadest near the centre. Length of body 1.02—2.69 mm, maximum width 0.489 to 1.196 mm. Cuticle solid, with numerous spines distributed over the surface which are densest in the anterior portion. Oral sucker subterminal, muscular, spherical or eliptic, length 0.180—0.312 mm, width 0.180—0.272 mm. Acetabulum smaller, less muscular, placed in about the first third of the body (in younger individuals nearer to the centre of the body), almost spherical in shape, measuring 0.108—0.231 by 0.136—0.244mm. Ratio of suckers: 1 : 1.29—1.3. The prepharynx, placed below the oral sucker, passes into a muscular pharynx, moderately pear-shaped or spherical, measuring 0.075—0.108 by 0.084—0.122 mm. The pharynx is followed by a very short oesophagus, maximum length 0.068 mm, branching off in two intestinal caeca in front of the acetabulum. Intestinal branches reaching approximately to mid-body. Testes near median line of body, subsymmetrical closely behind the bifurcation of the caeca; they are spherical in shape and about equal in size. The right testis is situated slightly above the left testis. Measurements of right testis 0.120—0.240 by 0.150—0.204 mm, left testis 0.135 to 0.240 by 0.153—217 mm. The ovary, more or less spherical in shape, 0.102—0.217 by 0.120—0.258 mm, is situated closely below the right testis, slightly overlapping its posterior margin. Sometimes it is insignificantly bigger or even smaller than the testes. The cirrus pouch is thin-walled, median, in front of the acetabulum, which sometimes overlapses its posterior part; it contains a seminal vesicle, a prostatic part and a short cirrus. The genital pore almost median, immediately in front of the bifurcation of the caeca, on the level of the posterior margin of the pharynx. The uterus forming upward and downward loops fills in almost the whole space below the acetabulum. The eggs yellowish-brown, operculated, measuring 0.036 to 0.045 mm in length and 0.024—0.030 mm in width. The follicles of the vitellaria are of medium size extending along the outer side of the caeca. They start at the level of the posterior portion of the oral sucker extending to the end of the intestinal branches. They are moderately wider in the oesophagus region. The posterior portion of vitellaria is often covered by the uterus.

The species *M. crossophorum* was described originally from the intestine of *Bufo peltacephalus* of Cuba, but not found since. The note of Skrjabin (1959) that this species was found and described by Pérez Vigueras from the island of Jamaica, is incorrect. Pérez Vigueras (1942) described this species from the village Jamaica near Havana (province Havana) and not from the island of Jamaica. Our trematodes are almost in harmony with the description of Pérez Vigueras (1942) from the typical host, differing substantially only in measurements of the eggs. But when comparing the drawing of this species given by Pérez Vigueras with that of our material of the same size of the body (Fig. 1 B, C), we found eggs of the same size in both cases; therefore, the measurements of the eggs, given by Pérez Vigueras, seem incorrect. Apart from that the species *M. crossophorum* would be an exception in the genus *Mesocoelium*, where all species of this genus are known to have eggs of similar sizes (length not above 0.052 mm, width not above 0.031 mm.).

The species *M. crossophorum* is closely related to the species *M. americanum* Harwood, 1932, differing from it only in the ratio of the suckers, the position of the genital pore and the location of the spines on the cuticle. There is also a close realationship with the species *M. travassosi*, the differences being in the ratio of the suckers, in the smaller eggs, in the position of the genital pore and in the absence of the prepharynx.

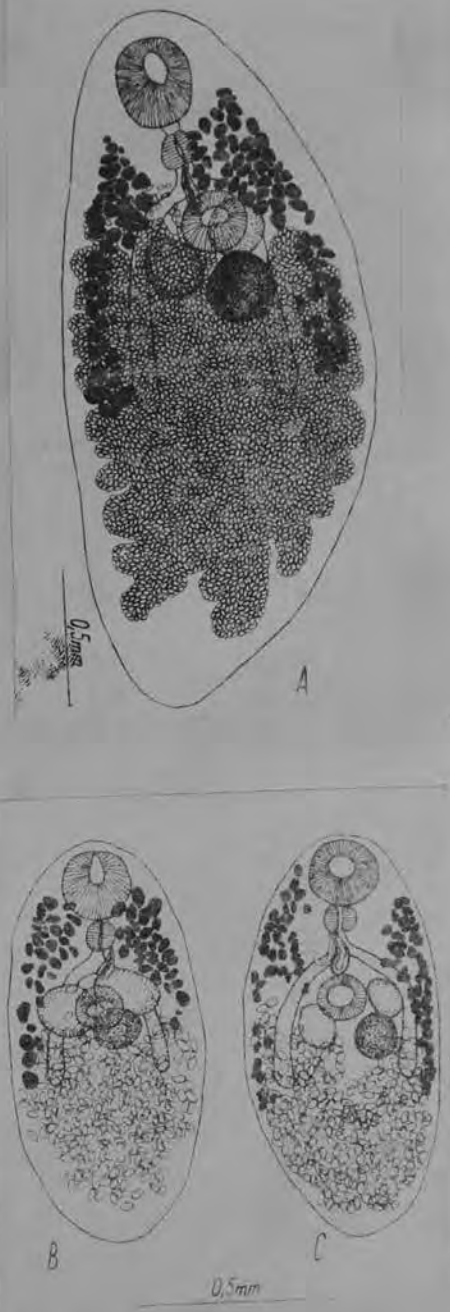


Fig. 1. *Mesocoelium crossophorum* Pérez Vigueras, 1942 from the small intestine of *Hyla* (*Aparasphenodon*) *brunoi*. A, B — original; C — after Pérez Vigueras (1942).

Dicrocoeliidae

1935

Mesocoelium danforthi, n. sp. (Dicrocoeliidae), from a lizard, Celestus plcii, in Puerto Rico. W. A. Hoffman, School of Tropical Medicine, San Juan, P. R.

This work was done in the laboratory of the Zoological Division of the U. S. Bureau of Animal Industry, Washington, D. C. The writer is indebted to Dr. E. W. Price for aid and counsel rendered during the course of this study.

Mesocoelium danforthi, n. sp.

Description.—Body elongate oval, 1.31 to 1.65 mm long by 0.54 to 0.58 mm wide, posterior end slightly more rounded than anterior; cuticula apparently without spines. Oral sucker subterminal, slightly longer than wide, 0.296 to 0.300 mm wide by 0.328 to 0.336 mm long, covered by a membrane with a longitudinal median slit. Acetabulum nearly circular, 0.148 to 0.172 mm in diameter; longitudinal diameter about half that of oral sucker, its anterior margin situated near junction of anterior and median thirds of body length. Prepharynx present, indistinct; pharynx semiglobular, about 0.110 by 0.088 mm. In all specimens examined the esophagus is so short as to appear nonexistent. Intestinal ceca extending horizontally, curving at an angle of almost 90 degrees, and then running parallel to lateral margins, barely attaining posterior third of body. Only posterior portion of excretory vesicle visible. Genital pore at level of base of pharynx; cirrus pouch narrowly piriform, about 0.146 mm long, its base beneath anterior margin of acetabulum. Testes broadly ovoid, 0.104 to 0.108 by 0.072 to 0.076 mm, situated obliquely on either side of acetabulum, one slightly anterior and the other somewhat posterior to it. Ovary subspherical, 0.100 to 0.136 mm by 0.08 to 0.096 mm, immediately behind and sometimes contiguous with right testis. Vitellaria extending from level of oral sucker into proximal portion of posterior third of body, terminating just beyond ceca. Seminal receptacle, yolk reservoir and transverse vitelline ducts not discernible, obscured by the numerous ova filling posterior half of body.

FIG. 13. *Mesocoelium danforthi*, n. sp., ventral view.

Habitat.—Intestine of a lizard, *Celestus plcii*, collected by Dr. S. T. Danforth at El Yunque, a mountain in the Luquillo National Forest, Puerto Rico, March 29, 1934; captured at altitude of 2000 ft.

Specimen.—U. S. N. M. Helm. Coll. Nos. 39570 (type) and 39571 (paratypes).

Mesocoelium danforthi is closely allied to *M. sociale* (Lühe, 1901), *microon* Nicoll, 1914, *americanum* Harwood, 1932, *meggitti* Bhalero, 1927, and *monodi* Dollfus, 1929. From all these, *danforthi* differs in having the longitudinal diameter of the oral sucker approximately twice that of the acetabulum, in the small size of its eggs, and with possible exception of *americanum*, in its ovary being larger than either testis. The cirrus pouch of *americanum* does not extend to the acetabulum, as it does in the case of *danforthi*.

see Mettrick & Dunkly, 1968

Mesocoelium danforthi Hoffman, 1935

From Mettrick & Dunkley, 1968

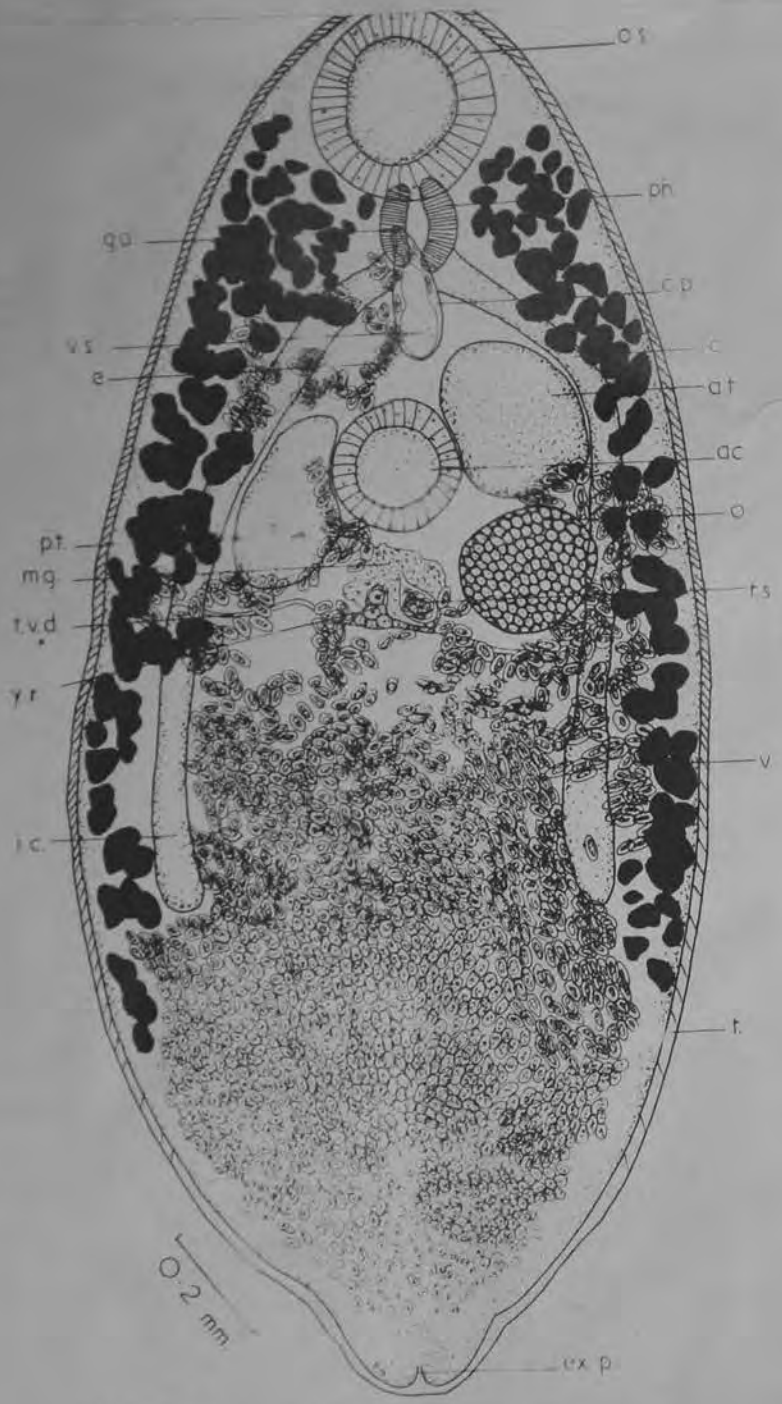


FIG. 1. Whole mount of *Mesocoelium danforthi*; ventral view.

Mesocoelium dolichoenteron Richard, 1965

Nous décrivons trois individus, dont un apparemment juvénile, de l'intestin de *Hydrosaurus boutonii bibroniiformis* Boettger, 1893 (Scincidae), provenant de l'Ile d'Europe (Sud-Ouest de Madagascar).

Description

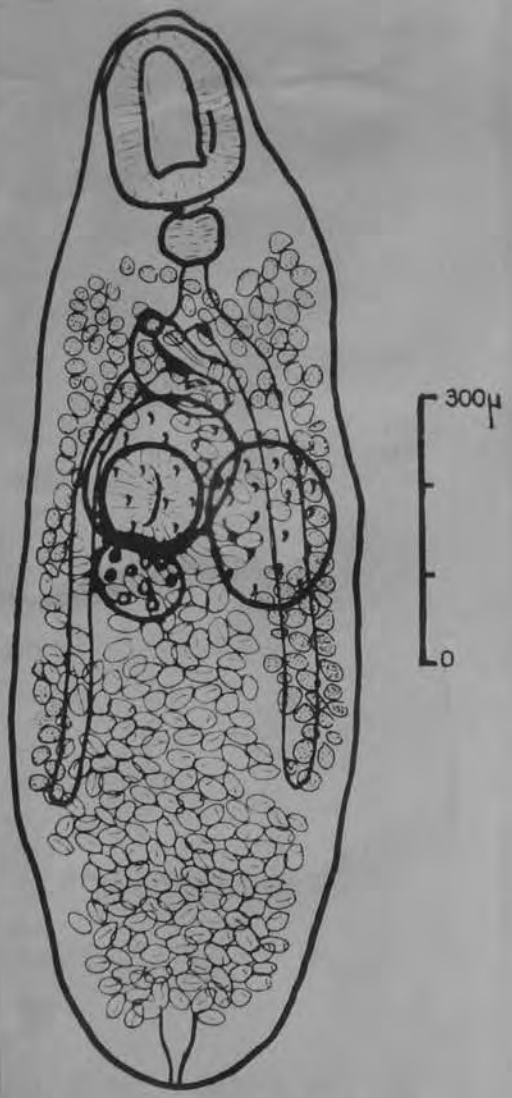
Corps ovale, trois fois plus long que large, couvert depuis la région antérieure jusqu'au niveau de l'ovaire, de petites épines, visibles chez le spécimen jeune seulement.

Ventouse buccale plus grande que la ventrale, celle-ci située juste en avant de la mi-longueur du corps. Prépharynx très court. Pharynx trois à trois fois et demi plus court que la ventouse buccale. Œsophage court. Caeca intestinaux se terminant aux 3/4 de la longueur du corps.

Ovaire et testicules intracoecaux, globuleux. Testicules très volumineux, situés au niveau de la ventouse ventrale, le droit légèrement plus en avant que le gauche. Poche du cirre piriforme, grande. Orifice génital au niveau de la bifurcation intestinale et à droite de l'œsophage. Ovaire situé à droite, en arrière des testicules, et presque deux fois plus petit qu'eux. Vitellogènes composés d'un grand nombre de follicules globuleux s'étendant latéralement du postpharynx à l'extrémité des caeca, qu'ils recouvrent dorsalement, et confluant en avant de la ventouse ventrale sauf chez le spécimen jeune. Vitelloductes transverses, passant en arrière de l'ovaire. Utérus à nombreuses sinuosités, remontant à gauche de la poche du cirre pour aboutir au pore génital situé à droite de la bifurcation intestinale.

Dimensions des trois spécimens :

Longueur totale	1,22mm	1,05mm	823µ
Largeur maximum	377µ	392µ	249µ
Ventouse buccale	200/150µ	206/180µ	171/147µ
Ventouse ventrale	122/108µ	113/93µ	108/102µ
Pharynx	53/73µ	50/69µ	44/53µ
Testicule droit	180/150	137/113µ	113/88µ
Testicule gauche	176/150µ	176/118µ	108/78µ
Ovaire	88/107µ	88/118µ	69/64µ
Poche du cirre	150/40µ		
Rapport des longueurs Ventouse ventrale/Ventouse buccale	0,61	0,54	0,63
Position de la ventouse ventrale dans la longueur du corps	1/2	1/2,3	1/1,9
Oeufs	36/37µ	23/24µ	



Discussion

Trente-cinq espèces ont été décrites dans le genre *Mesocoelium* Odhner 1910. Trente-deux sont citées par Skrjabin 1959 auxquelles nous devons ajouter les trois espèces décrites plus récemment d'Afrique par Vercammen-Grandjean 1960 : *M. brieni*, *M. buttnerae*, *M. caputti*.

Freitas 1963, n'admettant pas la valeur de nombreux caractères spécifiques (position et dimensions des ventouses et des glandes génitales, étendue des vitellogènes et des caeca), réduit à sept le nombre d'espèces initial.

Il est possible que la thèse de Freitas soit exacte, mais en l'absence d'études expérimentales montrant le degré de variabilité d'une espèce, il nous semble dangereux d'admettre *a priori* toutes ces synonymies, surtout lorsqu'il s'agit d'espèces parasites de Reptiles ou de Batraciens ayant une distribution géographique étroitement localisée.

Nous remarquons en outre que la position des organes et leurs rapports demeurent bien constants chez nos trois spécimens bien que nous ayons deux formes âgées et une forme apparemment juvénile.

Nous admettons donc provisoirement l'existence des trente-cinq espèces de *Mesocoelium*.

-OVER-

Une espèce rapportée à *M. manodi* Dollfus, 1929 a déjà été décrite de Madagascar par A. Capron, S. Deblock et E. R. Brygoo 1961 chez *Chamleo pardalis* et *Chameleo oustaleti*. Nous remercions les auteurs qui ont bien voulu nous prêter leurs spécimens pour les comparer aux nôtres. Chez tous les spécimens malgaches de M. *manodi*, l'ovaire est grand par rapport aux testicules, les vitellogènes ne confluent pas en avant de la ventouse ventrale, la forme des follicules vitellogènes et le rapport des ventouses sont différents.

Les trois individus dont nous disposons sont remarquables par des *coeca* longs atteignant les 3/4 de la longueur du corps et un ovaire petit par rapport aux testicules. Nous les rapprocherons donc de trois espèces qui ont les même caractères : *M. sociale* Lühe, 1901 parasite de *Bufo melanostictus* Inde, *M. meggitti* Bhalerao, 1927 de *Mabuya dissimilis* (Inde), et *M. cameroonensis* Saoud, 1964 de *Rana* (*Ptychadena*) *oxyrhynchus* (Cameroun).

Chez *M. sociale* la ventouse ventrale est plus grande et située plus en avant, la ventouse buccale est plus petite, les dimensions du corps, de l'ovaire et des œufs sont supérieures à celles relevées chez nos échantillons. L'hôte, un Batracien, et le lieu géographique (Indes), sont enfin très différents.

Chez *M. cameroonensis*, également décrit chez un Batracien, les vitellogènes atteignent le niveau moyen de la ventouse buccale, l'œsophage est absent, et le pore génital est situé juste en arrière de la ventouse buccale ; il est donc très différent de nos échantillons.

M. meggitti décrit chez un Scincidé par Bhalerao (1927) est l'espèce qui se rapproche le plus de nos spécimens. Elle s'en distingue cependant par la position de la ventouse ventrale qui est située dans le premier tiers de la longueur du corps, par la position de l'orifice génital, par les dimensions de l'ovaire et par sa distribution géographique.

Nous admettrons donc que l'espèce est nouvelle et nous la nommerons *Mesocoelium dolichenteron* n. sp. RICHARD, 1965

Mesocoelium elongata Goto et Ozaki, 1929

-OVER-

Figs. 3-4. *Mesocoelium elongata* Goto et Ozaki, 1929
3- normal body
4- abnormal body

2) *Mesocoelium elongata* Goto et Ozaki, 1929
，1974年4月，熊本県天草群富岡で得られたイモリ *Triturus pyrrhogaster* 約100匹を解剖し，約200個体の

From Uchida and Itagaki, 1976

Table 3 Measurements (in mm) of normal and abnormal specimens of *M. elongata*

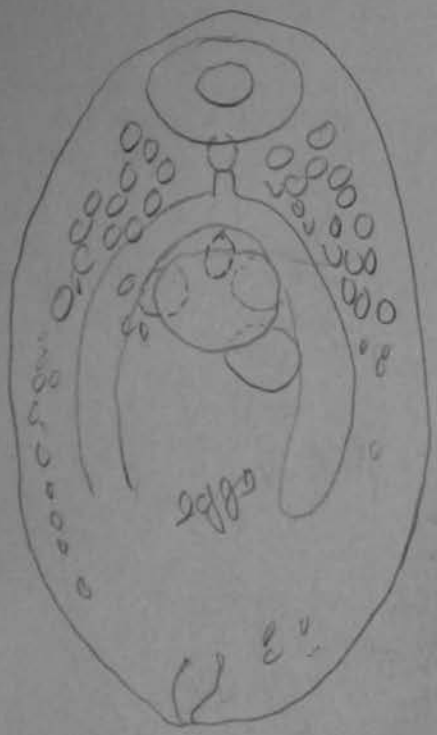
	Normal body (Goto et Ozaki, 1929)	Abnormal body (The present authors)
Body length	1.78-1.82	1.6
Body breadth	0.420.46	0.44
Oral sucker	0.22-0.46	0.25
Acetabulum	0.17	0.18
Esophagus	0.07	0.07
Ovary	0.10-0.11	0.11
Testis (right)	0.10-0.12	0.13×0.13
〃 (left)	0.10-0.14×0.07-0.09	0.12×0.11
〃		0.13×0.13
Cirrus pouch	0.13×0.05	0.14×0.06
Eggs	0.04-0.043×0.025-0.027	0.038-0.052×0.022-0.030

One hyperformed specimen was found among the trematodes *Mesocoelium elongata* of newts *Triturus pyrrhogaster* collected in April 1970 at Tomioka of Kumamoto Prefecture. This trematode specimen developed one more testis in addition to the normal two testes and these three testes appear to function normally from their histological observations. No report has been published on hyperproduction of the testes in any spcies of trematodes, though the defermity of the organ has been reported by Ruszkowski (1925), Bhalerao (1926), Travassos (1928) and Yamashita (1937, 1938).

Mesocoelium incognitum Travassos,1921

Size 0.922 to 1.50 by 0.55 to 0.93
Oral sucker 0.22 to 0.27
Acetabulum 0.17 to 0.26
Pharynx 0.035 to 0.26 in diameter
Esophagus short, ceca average 0.43 to 0.69
Genital pore bifurcal
Cirrus sac 0.071 bo 0.170
Testes preequatorial
Ovary posttesticular
Vitellaria extracecal, preequatorial
Eggs 35 to 40 by 21 to 28 u
Excretory vesicle Y-shaped.
Host: unknown, probably a batrachian.
Brazil

Brazil-Medico, vol.35:221-222. 1921



MESOCOELIUM MAGREBENSE R. Ph. Dollfus 1954

(Fig. 24)

MATÉRIEL EXAMINÉ : Un individu de l'intestin d'un *Coluber* (*Zamenis*) *hippocrepis* L. 1758 ♂, des environs de Rabat, 22-6-1958. *Ipse legi* (1.)

DIMENSIONS (mm)

Longueur	4,0
Largeur	1,25
Ventouse orale	0,375
Ventouse ventrale	0,242
Pharynx	0,116 × 0,127
Testicules	0,226
Ovaire	0,200 × 0,264
Œufs (μ)	32,7-38,7 × 23,6

J'ai décrit cette espèce (1954 p. 647-650 fig. 37-38) d'après un unique spécimen récolté aussi chez *Coluber* (*Zamenis*) *hipporrepis* L., mais provenant du Moyen Atlas occidental et j'ai discuté ses affinités avec les espèces voisines de *Mesocoelium*.

Comme il s'agit d'un genre où les espèces présentent des variations individuelles assez étendues en rapport avec l'âge et les dimensions, j'estime utile de ne pas me contenter de la figuration d'un seul spécimen et je figure aujourd'hui des spécimens de beaucoup plus grandes dimensions que le spécimen-type.

J. F. TEIXEIRA DE FREITAS (1963 p. 303-306) met *M. magrebense* R. Ph. D. 1950, *marocanum* R. Ph. D. 1950, *georgesblanci* R. Ph. D. 1954, *brachyenteron* R. Ph. D. 1954, *schwetzi* R. Ph. D. 1950, *monodi* R. Ph. D. 1929 et beaucoup d'autres espèces, en synonymie de *Mesocoelium monas* (Rudolphi 1819), du Brésil. Je ne suis pas d'accord avec FREITAS.

FROM DOLLFUS, 1964

Fig. 24

Mesocoelium magrebense R. Ph. Dollfus 1954, de l'intestin de *Coluber* (*Zamenis*) *hippocrepis* L. Environs de Rabat 22-6-1958.

Mesocoelium megaloon Johnston,1912

Habit slender and delicate,elongate oval,broader behind, 1.8 by 0.358. integument smooth, without spines; oral sucker 0.1935, ventral 0.0645; ratio 3:1. Esophagus moderately long,intestinal limbs short,hardly reaching beyond ovary. Testes oval,placed dorsally and laterally in regard to the oral sucker (misprint for ventral sucker ?) and extending backwards behind it; ovary spherical, 0.112 in diameter; not quite lateral but latero-median,more on the left side. Yolk glands with rounded to oval follicles, from 0.017 to 0.034 in diameter,comparatively numerous, about 70 on each side; the two lateral groups extending near the dorsal surface across the body to the middle line,but posteriorly not extending beyond the ovary. Eggs comparatively large and thick shelled, average 47 µ; size 43 to 52 by 29 µ.
Host: Hyla ewingii in the duodenum
Locality: Australia

Based on a single specimen

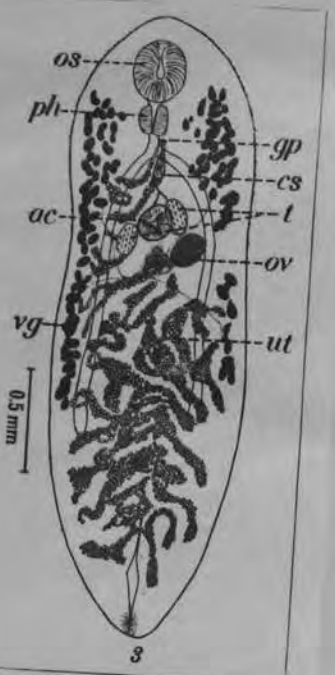
MESOCOELIUM MEGGITTI Bhalerao, 1927. Plate 1, fig. 2.

Numerous specimens of this fluke were collected on two occasions from the small intestine of the common ground lizard *Mabuia multifasciata* Kühl. Except for minor details, they resemble the form described by Bhalerao (1927) from a Rangoon lizard, *Mabuia dissimilis*, under the name *Mesocoelium meggitti*. The differences, it is believed, are due to the age of the specimens, those of Bhalerao being apparently young mature specimens. Our Philippine material is a mixture of young and fully developed mature specimens, the former tallying with Bhalerao's description.

Description.—Body elongate, flat, broader anteriorly than posteriorly, measuring 1.02 to 3.30 by 0.36 to 1.03 millimeters. Cuticle beset with minute spines at anterior half or two-thirds of body length. Oral sucker ventroterminal, 0.14 to 0.27 millimeter in transverse diameter; acetabulum between anterior and middle thirds of body length, much smaller than oral sucker, 0.07 to 0.17 millimeter across. Mouth ventroterminal, separated from pharynx by very short prepharynx; pharynx 0.05 to 0.10 by 0.06 to 0.13 millimeter in size; œsophagus 0.02 to 0.08 millimeter long; intestinal cæca simple, terminating at level between middle and last thirds of body length or very close to that level.

Reproductive glands grouped around acetabulum. Testes oval, slightly preovarial on each side of acetabulum, the one on the same side as the ovary usually more advanced anteriorly than the other; they are nearly equal in size, measuring 0.08

(Philip. Journ. Sci., 44, No. 4.



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to 0.17 by 0.07 to 0.12 millimeter; cirrus sac small, median, between pharynx and acetabulum, 0.25 to 0.27 by 0.04 to 0.05 millimeter in size, inclosing small seminal vesicle, pars prostatica, and cirrus. Common genital opening median or slightly to one side of median line, at middle level of œsophagus.

Ovary oval, to one side of median line, post-testicular, though often occurring almost at the same level as opposite testis, measuring 0.08 to 0.20 by 0.07 to 0.15 millimeter; shell gland appears diffuse, close to mesial side of ovary; receptaculum seminis and Laurer's canal present. Uterus mostly postovarial, reaching to near posterior end of body; occurs in two loops, each with numerous transverse loops:—a descending loop filled with colorless unripe eggs and an ascending loop filled with yellowish to dark brown mature or ripe eggs. Vitellaria in distinct follicles, extending on both sides of body from posterior level of oral sucker to near one-third the distance of body length from posterior end. Mature eggs operculated, 30 to 36 by 20 to 24 microns in size.

Excretory pore at posterior end of body; excretory bladder a narrow or dilated canal extending from excretory pore at posterior end of body to behind shell gland, where it divides into two lateral branches.

Host.—*Mabuia multifasciata* Kühl.

Location.—Intestine.

Locality.—Los Baños, Laguna Province, Luzon.

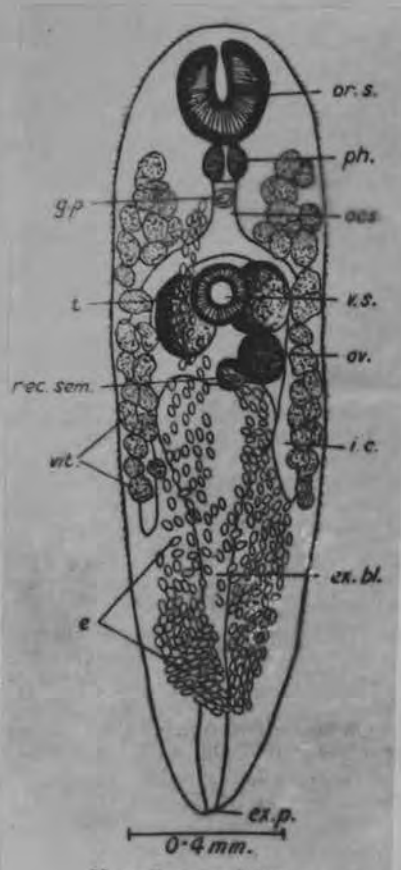
From Tubangui, 1931

Mesocoelium meggitti Bhalerao,

0·2 mm. The ventral sucker is situated at one-third the distance of the body from the anterior end, and is circular, measuring about 0·13 mm. in diameter. The ratio between the size of the two suckers is 3:2. The pharynx is short, muscular, and measures 0·07 × 0·1 mm. The œsophagus is of moderate length. The intestinal cæca are simple and pass posteriorly along the sides of the body, and terminate much in front of the posterior end. The excretory pore is situated at the posterior end of the body. It leads into a simple bladder, which extends anteriorly to a short distance behind the ovary, where it bifurcates into two short arms which diverge towards the sides of the body. On the dorsal side of the pharynx is seen a short stout nervous band, which gives two short branches anteriorly and two somewhat long branches posteriorly. At the sides of the band are observed short nerves that pass towards the sides of the body.

The testes are two round to oval bodies, measuring 0·16–0·18 × 0·13–0·14 mm. They are situated on the dorsal side of the ventral sucker and are almost symmetrical. The majority of specimens have the right testis slightly in advance. The vasa efferentia arise from their anterior ends and meet centrally to form a short common duct—the vas deferens. The cirrus-sac is small and is situated centrally a short distance in front of the ventral sucker; more than one-third of its length is occupied by the vesicula seminalis. The pars prostatica and the ductus ejaculatorius are very small. The genital pore is situated a short distance behind the pharynx, ventral to the œsophagus.

The ovary is a small round body situated behind the right testis and measuring 0·11 × 0·095 mm. Situated posteriorly to the ovary is a small round receptaculum seminis, measuring 0·06 mm. in diameter. The shell-gland is situated in the middle line a short distance behind the receptaculum seminis. Laurer's canal is small. The uterus appears to arise from the shell-gland, and passes anteriorly to the right side as far as the ovary. It then passes posteriorly and coils itself on the right side of the body, after which the coils pass towards the left side anteriorly as far as the hinder end of the left testis, sometimes overlapping the latter. Its terminal portion passes on the dorsal side of the ventral sucker, and opens to the exterior by means of the genital pore. The vitellaria consist of small rounded follicles and vary considerably in their extent in different specimens. Two short stout vitelline ducts are seen posterior to the shell-gland. The uterus is filled with two kinds of ova—small, rounded, thin-shelled ones in its posterior portion, and in the anterior coils oval



Mesocœlium meggitti, sp. n.

with yellowish-brown shell, operculated at one end. [illegible] 0·034–0·037 × 0·023–0·026 mm.

The genus *Mesocœlium* was proposed by Odhner (1911) for the species from *Bufo melanostictus* described by Lühe

(1901) as *Distomum sociale*. After that Johnston (1912) added three new species—*M. mesembrium*, *M. megaloon*, and *M. oligoon*. Nicoll described (1914) *M. microon* from the duodenum of *Hyla coecilea*. André (1915) described *M. carli*, and, lastly, Skrjabin added (1922) a species from the intestine of *Chamæleon* which he named *M. sokolwi*. Of these the last one appears to be wrongly included in the genus *Mesocœlium*. The important features of this genus are (1) the shortness of the intestinal cæca, and (2) the extension of the vitellaria anterior to the intestinal fork. The species of Skrjabin, however, has the intestinal limbs extending as far as the posterior end of the body, the alimentary canal is without œsophagus, the vitellaria are situated only posterior to the testes, and the greatest breadth is at the level of the ovary. With these characteristics it cannot be accommodated in the genus *Mesocœlium*; the genus in which it can be fitted in most appropriately is *Platynosomum*, Loose, 1907, and *M. sokolwi* should become *Platynosomum sokolwi* (Skrjabin, 1922). Out of the remaining six species the present one agrees best with *M. microon*, Nicoll, 1914. The points of agreement are the general dimensions of the body, the ratio of the suckers, the lengths of the intestinal cæca, and the extension of the vitellaria; it differs, however, in the shape of the body, in having the right testis in advance instead of the left, the ovary situated to the right of the middle line instead of to the left, the receptaculum seminis close to the ovary instead of being far removed, and in the host being a reptile instead of an amphibian. These points being of sufficient importance to justify the creation of a new species, I propose the name *Mesocœlium meggitti* for it, in honour of Professor Meggitt, who kindly placed the specimens at my disposal.

Specific Diagnosis.—Mesocœlium. Body broad anteriorly and tapering posteriorly. Cuticle beset with spines. The ratio of the suckers 2 : 3. Intestinal cæca extending from a half to seven-elevenths of the total length of the body. Testes at the sides of ventral sucker, the right slightly in advance. Cirrus-sac not reaching ventral sucker. Ovary on the right side of the middle line. The extent of the vitellaria variable. Receptaculum seminis close to ovary. Eggs dimorphic, operculated, 0·034–0·037 × 0·023–0·26 mm.

Host. *Mabuia dissimilis.*

Loc. Rangoon.

Mesocoelium meggitti n. sp.—Numerous specimens of this species were obtained at Rangoon from the intestine of *Mabuia dissimilis*. It has the following specific diagnosis:—Body broad anteriorly and tapering posteriorly. Cuticle beset with spines. The ratio of the suckers 2 : 3. Intestinal caeca extending from 1/2 to 7/11 of the total length of the body. Testes symmetrical at the sides of ventral sucker, the right slightly in advance. Cirrus-sac not reaching ventral sucker. Ovary on the right side of the middle line. The extent of vitellaria varying. Receptaculum seminis close to ovary. Eggs 0·034–0·37 x 0·023–0·026 mm.

From Bhalerao, 1927

See Balasingam, 1963

Mesocoelium mesembrinum Johnston,1912

Moderately small worms, length 2.3. Oral sucker the larger,ratio to ventral sucker ## 3:2. Body closely covered with small spines, gradually becoming fewer and smaller up to the posterior end. Pharynx well developed; intestinal limbs reaching the middle of the body. Excretory vesicle tubular,reaching up to shell gland, inconspicuously divided in its anterior part. Testes symmetrically placed near the ventral sucker; ovary behind the right testis; copulatory organs moderately well developed. Genital pore in the middle line, halfway between pharynx and ventral sucker. Seminal receptacle and Laurer's canal present. Uterus filling up the posterior part of the body. Yolk glands laterally placed in the anterior part of the body,not passing inwards beyond the intestinal limbs,nor backwards beyond the ovary. Eggs thick-shelled,light brown at first, becoming dark brown; 40 by 25 µ.
Host: Hyla caerulea . In the duodenum
Locality: Australia

Johnston says this worm is closely related to Distomum sociale Luhe, having the same generic characters but differing in degree of spininess, ratio of suckers, in less extended yol-glands.

M. mesembrinus X33

Mesocoelium microon Nicoll, 1914

(Plate XXIII, fig. 4.)

This species was obtained from the duodenum of *Hyla coerulea*, *H. gracilenta* and *Tiliqua scincoides*. It is very common and usually occurs in numbers of from 10 to 40 in each host.

It is a moderately small species, measuring 1–2 mm. in length. In pressure preparations the length may be as much as 3·5 mm. No specimens under 1 mm. were obtained and one measuring 1·1 mm. was fully mature. In three of the larger specimens the average length was 1·94 mm. and the greatest breadth, just behind the ventral sucker, was 0·77 mm. The outline is elongated oval, pointed at both ends.

The cuticle is covered with minute closely-set spines which disappear gradually towards the posterior end. The oral sucker, which is usually elongated longitudinally and which has an elongated aperture, measures 0·25 mm. in diameter. The ventral sucker which is usually transversely elongated measures 0·18 mm. in diameter. The ratio of the suckers is therefore considerably less than 3 : 2. The ventral sucker is situated at a distance of 0·57 mm. from the anterior end.

The pharynx is almost contiguous with the oral sucker and measures 0·08 mm. in length and breadth. The oesophagus is twice as long as the pharynx, and the intestinal diverticula extend a little beyond the middle of the body.

The excretory vesicle extends forward to a short distance behind the receptaculum seminis.

The genital aperture is situated in the middle line a little in front of the intestinal bifurcation. The short slender cirrus-pouch reaches back to just in front of the ventral sucker. It contains a small vesicula seminalis, an almost globular pars prostatica and a long ductus ejaculatorius.

The testes are situated on the level of the ventral sucker and overlapping it to some extent. They are rarely symmetrical, the left usually being a little in advance of the right. They are irregularly rounded bodies measuring about 0·21 × 0·14 mm. There is considerable variation in their position, size and shape.

The ovary lies on the left side almost immediately behind the left testis. It is a large rounded or somewhat heart-shaped body measuring 0·15 mm. in diameter. On its inner side lies the shell-gland complex with a small receptaculum seminis. The yolk glands extend from the oral sucker to near the end of the intestinal diverticula. Behind the ventral sucker they are confined for the most part to the outer side of the diver-

Eggs33 to 41 by 24 to 28 μ.
Locality: Australia

Mesocoelium monas (Rudolphi 1819) Freitas 1958

1. *Mesocoelium monas* (Rudolphi 1819) Freitas 1958 (Brachycoeliidae): one adult worm from the small intestine of *Lutjanus cyanopterus* (Cuv. & Val.) (Perciformes: Lutjanidae) at La Guardia, Nueva Esparta State. Specimen deposited: No. 72881. This is the second record of a species of this genus from a fish; Fischthal & Kuntz (1965) reported the new species *M. scatophagi* from a perciform (Scatophagidae) marine fish from North Borneo (Malaysia).

FROM Fischthal AND Nasir, 1974

Sous-famille Mesocoeliinae Dollfus, 1929

Mesocoelium monodi Dollfus, 1929

Matériel: Nombreux échantillons récoltés par le Dr V. Aellen chez *Mabuya* sp. à Duékoué (15.3.53).

Cette espèce, dont la variabilité est tellement grande (Szidat, 1932) ne paraît pas inféodée à des hôtes particuliers. Elle est signalée, au Congo Belge, chez *Rana mascareniensis* Günth. et chez *Bufo regularis* Reuss, au Caméroun, chez *Chamaeleon gracilis* Hallowell et au Liberia, chez les deux Amphibiens mentionnés ainsi que chez *Agama colonorum* Daud., *Lygosoma fernandi* Bust et *Mabuya maculilabris* F. Müll. Par conséquent, sa présence en Côte d'Ivoire devenait presque inévitable.

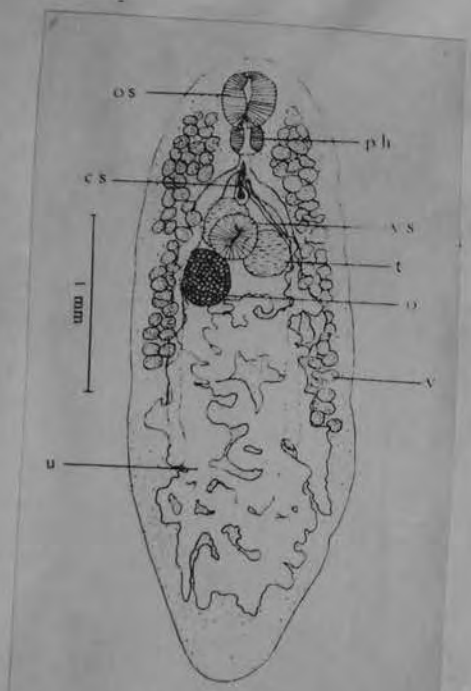


Fig. 3.

From Prudhoe, 1957

(over)

Family DICROCOELIIDAE Odhner, 1910.

From Prudhoe, 1957

Mesocoelium monodi Dollfus, 1929.

(Fig. 3.

Hosts and locality :

Bufo regularis; *Rana mascareniensis*. Mabwe, 585 m (1611 *c*, 1612 *c*).

This species appears to be widely distributed among anurans and saurians in West Africa. It was originally described by Dollfus (1929) from *Chamaeleon gracilis* in the Cameroons. Szidat (1932) later recorded *M. monodi* from *Rana mascareniensis*, *Bufo regularis*, *Agama planiceps*, *Agama colonorum*, *Lygosoma fernandi* and *Mabuia maculilabris* in Liberia, while Baylis (1936) recorded it from *Chamaeleon etiennei* in the Belgian Congo.

The following description is based solely upon specimens in the present collection. The worms are dorso-ventrally flattened and elongate oval in outline. They measure 2,5-3,5 mm in length and 0,75-1 mm in maximum width. The cuticle is provided with closely-set rows of minute spines, extending posteriorly as far as the hinder limit of the vitelline follicles. The subterminal oral sucker has an elongate opening. It is rounded (0,33 mm in diameter) or oval (0,3-0,33 mm in length and 0,25-0,30 mm in width). The ventral sucker is situated at about the junction of the first and second thirds of the total length of the body and measures 0,18 mm to 0,27 mm in diameter. The oral sucker appears to open into a well-developed pharynx which is more or less transversely oval, measuring 0,10-0,15 × 0,13-0,20 mm. When an oesophagus is apparent, it is very

short. The intestinal caeca are relatively wide and extend to a little beyond the middle of the body. The genital pore occurs immediately behind the pharynx, in the region of the intestinal bifurcation. The thin-walled cirrus-sac is pyriform or flask-shaped and extends to near the ventral sucker. It contains a well-developed seminal vesicle, apparently constricted into two portions, opening into a coiled ejaculatory duct, which shows no differentiation of a pars prostatica nor of a cirrus. As in other members of the genus *Mesocoelium*, the testes are arranged symmetrically or somewhat obliquely in the region of the ventral sucker. They are rounded and measure 0,20-0,30 mm in diameter. The ovary lies to the right or to the left of the median line, immediately behind and contiguous with the testis of that side. It is more or less rounded and sometimes a little larger than the testes, measuring 0,22-0,33 mm in diameter. The vitellaria consist of numerous rounded follicles situated at the sides of the body, extending from the region of the oral sucker to near the posterior ends of the intestinal caeca. The follicles lying on the same side of the body as the ovary seldom extend posteriorly as far as those in the opposite field. The uterus is voluminous and thrown into a large number of coils, which occupy most of the body behind the ventral sucker. The eggs are very numerous and measure 0,035-0,038 × 0,020-0,023 mm.

Dollfus (1950) has described a new species, *Mesocoelium schwetzi*, from *Rana mascareniensis* and *Bufo regularis* in the Belgian Congo. This species bears a very close resemblance to *M. monodi*, and merely appears to be a smaller form, with a comparatively larger pharynx. The validity of the differences enumerated by Dollfus for distinguishing *M. schwetzi* from *M. monodi* is doubtful, since, according to Dollfus (1929), Szidat (1932) and the present description, *M. monodi* is an exceedingly variable form.

Mesocoelium monodi Dollfus, 1929

(a) THE ANATOMY OF THE ADULT *M. MONODI* (FIG. 1)

Body elongate oval; up to 3 mm. in length; entire body surface armed with weak, backwardly pointing spines. Oral sucker subterminal. Ventral sucker smaller than oral sucker; at posterior level of anterior third of body; with oral opening on its ventral side. Prepharynx short. Pharynx oval or spherical; opening into short oesophagus. Gut caeca simple; lateral; extending to posterior level of vitelline glands, at anterior level of posterior third of body. Excretory bladder Y shaped, median stem extending from a short distance behind the receptaculum seminis to the terminal or subterminal excretory pore. Common genital pore in midventral, median position; beneath pharynx. Testes compact; oval; one preovarian; other lateral to ovary. Vasa efferentia short; joining to form very short vas deferens. Cirrus pouch club-shaped; with vesicula seminalis, ejaculatory duct and prostatic cells; extending in mid-line from behind gut bifurcation to mid pharyngeal level; opening into common genital pore. Ovary spherical or pear shaped; to right of median line; at level of, or slightly behind acetabulum. Oviduct short; arising from inner postero-dorsal surface of ovary; directed to left of ovary to form ootype surrounded by Mehlis's gland in mid-line after receiving short ducts from receptaculum seminis and median vitelline reservoir. Laurer's canal short; arising from oviduct near point of entry of receptaculum seminis; opening on dorsal surface near mid-line. Uterus emerging ventrally from ootype; occupying most of available space behind and lateral to ovary; distal part weakly muscular, opening into common genital atrium. Eggs oval; operculate. Vitelline follicles in two lateral groups; extending from anterior sucker to posterior level of gut caeca; transverse yolk ducts running dorsally at posterior margin of ovary to form vitelline reservoir in mid-line.

The adult *M. monodi* occurs in the duodenum of *Agama agama* and many other lizards and amphibia including *Bufo regularis*.

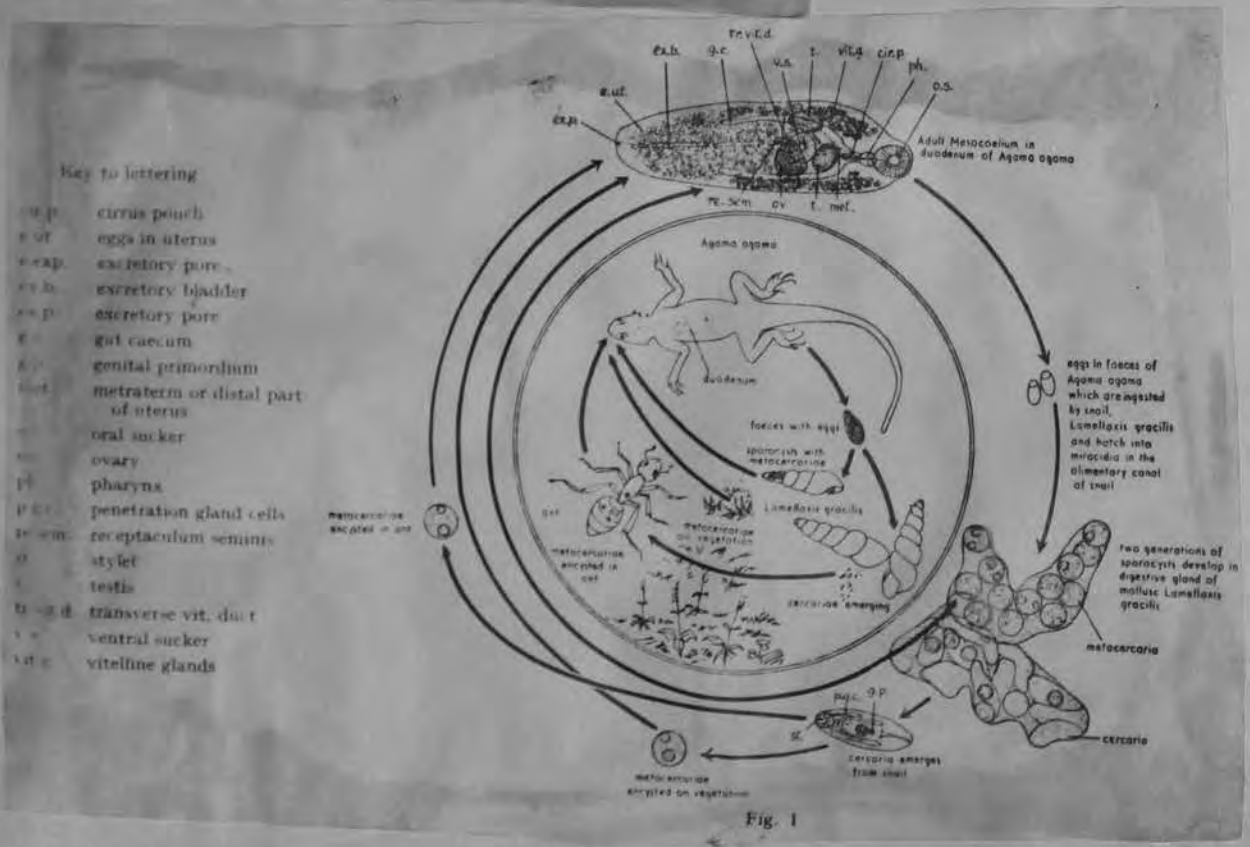


Fig. 1

– OVER –

(b) THE LIFE CYCLE (FIG. 1)

Investigation revealed that the likely intermediate host was the terrestria mollusc, *Lamellaxis gracilis* which occurs commonly in flower beds or in hole made by crickets, small rodents or scorpions in the vicinity of houses. Dissection of these molluscs revealed the presence of sporocysts in the digestive gland Cercariae emerging from these sporocysts were found to encyst readily on external objects including vegetation. When these metacercariae were fed to laboratory reared *Agama* lizards kept under controlled conditions adult *Mesocoelium monodi* were recovered in three days. Identical metacercariae were also found within the sporocysts and also in ants belonging to the genera *Camponotus* and *Crematogaster*. It is not known for certain how these ants were infected. The cercariae were tail-less, stylet forms with penetration and cystogenous gland cells. This larva is well adapted to a terrestrial existence as it is capable of moving in a very thin film of water by using its oral and ventral sucker to adhere to the substratum.

A detailed account of the cercaria, the life cycle and ecology of this parasite will be given in a later paper.

Up to the present time the life cycle of only one other species of the genus *Mesocoelium* has been described (Ochi, 1930) although thirty-two species of this circumtropically distributed genus are known (Dollfus, 1954). According to Ochi (1930), encysted 'adolescaria' of *Mesocoelium brevicaecum* occur in sporocysts in the only intermediate host, *Euhadra quaesita*. The life cycle of *M. monodi* differs in several respects from that of the species described by Ochi as may be seen from the short account, designed for school or university teaching, which is given below.

FROM THOMAS, 1963

Mesocoelium monodi Dollfus, 1929

FROM CAPRON, DEBLOCK, AND BRYGOO, 1961

Hôtes et localisation géographique.

Chamaleo oustaleti Mocquard : Andapa, MADAGASCAR

Chamaleo pardalis Cuvier : Fort-Dauphin.

Fréquence de l'infestation.

3 *Chamaeleo pardalis* sur 25 examinés.

1 *Chamaeleo oustaleti* sur 99 examinés.

	Mesocoelium monodi d'après Dollfus, 1929	*Mesocoelium monodi* souche malgache
Taille : longueur	jusqu'à 3 mm.	(2 mm.) - 3 mm - (4 mm.)
Taille : largeur	1,5 mm.	(370) - 1,077 µ - (1 440 µ)
Cuticule	Totalement épineuse.	Totalement épineuse
Ventouse orale	340 - 370 µ. Inerme.	(190) - 308 - (400) µ. Inerme
Ventouse ventrale	265	(160) - 260 - (350) µ
	Spinulation périventousaire rayonnante.	id.
Prépharynx	Très court (10 µ)	Très court (0 - 40 µ)
Pharynx	125 µ	80-100 × 100-110 µ
Œsophage	125 µ	(52) - 90 × 58 - (300) µ
Cæcums	3/5 du corps	2/3 du corps
Testicules	250 µ de ∅	10 µ ∅
Ovaire	225 × 300 µ ; 250 µ ∅	225 × 240 µ
Poche du cirre	110 à 200 × 80 µ (1)	(130) - 212 - (310) µ × 48
Œufs	35-38 × 20-23 µ	37,8 × 26,2 µ

(1) Valeurs approchées, calculées d'après les figures 9 et 10, p. 87 et 88

FIG. 20. — *Mesocoelium monodi* Dollfus, 1929. Intestin grêle de *C. cerrinosa*. Vue ventrale.

Mesocoelium monodi Dollfus, 1929

M. monodi was originally described by Dollfus, 1929 from *Chamaeleo gracilis* in the Cameroons. Szidat (1932) recorded it

from *Rana mascareniensis*, *Bufo regularis*, *Agama planiceps*, *Agama colonorum**, *Lygosoma fernandi* and *Mabuia maculilabris* from Liberia. Baylis (1939) reported it from *Chamaeleo etiennei* from the valley of the River Kwango in the Congo. Prudhoe (1957) described it from *Bufo regularis* and *Rana mascareniensis* from the Congo. Capron *et al.* (1961) recorded it from *Chamaeleo oustaleti* and *C. pardalis* from Madagascar. In the Sudan it has been recorded from *Bufo regularis* and *Varanus niloticus* (Khalil, 1962). In the present study it is recorded from *Rana* (*Ptychadena*) *mascareniensis* and *Agama agama agama**, from the Cameroons. This species seems to be extremely variable, having a wide range of hosts. Specimens of this species in the present material are in the same range of measurements and morphological variations reported by previous authors and so a further description is not needed. However it is interesting to note that the parasite was collected on one occasion from the stomach. The specimens collected from this location appear quite normal, being mature with many eggs in the uterus.

* *Agama colonorum* is considered now as a synonym of *Agama agama aguma*.

FROM SAOUD (1964)

1) *Mesocoelium monodi* Dollfus, 1929.

2 *Zonosaurus sp.* **Madagascar (Mahabo et Ambavaniasy). 1961 et 1964. Intestin grêle.**

Le premier de ces sauriens héberge 11 distomes qui ne se différencient pas de ceux parasites des caméléons (voir CAPRON et coll., 1961, p. 53). Le second en héberge cinq de plus petite taille, dont les mensurations et les rapports les rapprocheraient davantage du groupe fort homogène de *Mesocœlium* afro-asiatiques décrits sous les noms de *M. maggitti* Bhalerao, 1927, *M. burti* Fernando, 1933, *M. buttnerae* et *brieni* Vercammen-Grandjean, 1960. Seules des connaissances nouvelles concernant les formes larvaires et la biologie de ces helminthes résoudront peut-être le bien-fondé de leur distinction que leur morphologie seule rend problématique.

FROM DEBLOCK, CAPRON, & BRYGOO, 1965

Mesocoelium monodi Capron, Deblock & Brygoo, 1961: 7, 11, 13, 16, 17, 18, 53-58, 59, 60, fig. 20

Mesocoelium monodi Khalil, 1962

Mesocoelium monodi Babero & Okpala, 1962: 232-233

Mesocoelium monodi Saoud, 1964: 291-292

Habitat — Intestino delgado de **Chamaeleo oustaleti** Mocquard e **Chamaeleo pardalis** Cuv., intestino de **Bufo regularis** e **Varanus niloticus**; intestino delgado de **Agama colonorum.**

Distribuição geográfica — Madagáscar (Andapa e Fort-Dauphin), Sudão, Nigéria e Camerum.

Capron, Deblock & Brygoo estudam numerosos exemplares colhidos no intestino delgado de **Chamaeleo oustaleti** e **C. pardalis**, em Madapascar, descrevendo-os com os seguintes caracteres:

From J.F. Teixeira de Freitas -over-

Corpo alongado, lanceolado, com 1.44 a 4,00 mm de comprimento por 0,675 a 1.408 mm de largura; cutícula espinhosa; espinhos mais densos nos dois terços anteriores do corpo; ventosa oral subterminal, com 0.20 a 0.40 mm de diâmetro; acetábulo no limite dos dois primeiros terços do corpo, com 0.15 a 0,35 mm de diâmetro, com 4 a 5 fileiras concêntricas de minúculos espinhos de observação difícil; relação ventosa oral acetábulo igual a 1:0,85· préfaringe aparente; faringe bem desenvolvida, em média, com 0.098 mm de comprimento por 0.111 mm de largura; esôfago curto; cecos intestinais estendendo-se até quase o limite do segundo têrço posterior do corpo; poro genital geralmente bifurcal, podendo, entretanto, variar em sua posição: pré ou pós-bifurcal, deslocado lateralmente, quase látero-faringeano ou junto à ventosa oral encerra vesícula seminal bilobada, região prostática pouco desenvolvida e canal ejaculador sem cirro diferenciado; testículos iguais, pré-ovarianos, arredondados ou sub-ovais, com 0.125 a 0.2 mm de diâmetro, podendo ser pré-acetabulares, um dêles invadindo em parte a área da ventosa ventral, ou situados na zona acetabular ou, ainda, parcialmente pós-acetabulares; ovário ovóide, com 0,14 a 0,25 mm de diâmetro médio, em grande parte na zona do acetábulo e pós-testicular· espermateca com 0,030 mm de comprimento por 0,105 mm de largura, em forma de corno; glândula de Mehlis presente, mediana; canal de Laurer presente, longo e sinuoso; útero ocupando a porção posterior do corpo; ovos operculados, pardacentos, com 0.035 a 0.039 mm de comprimento por 0,022 a 0,030 mm de largura; vitelinos constituídos por folículos pequenos e compactos, que se estendem da zona da faringe ou da ventosa oral até o fim dos cecos intestinais; poro excretor terminal; vesícula excretora em Y.

Khalil, em 1962 assinala-a em **Bufo regularis** e **Varanus niloticus** no Sudão (cf. Saoud, 1964: 292).

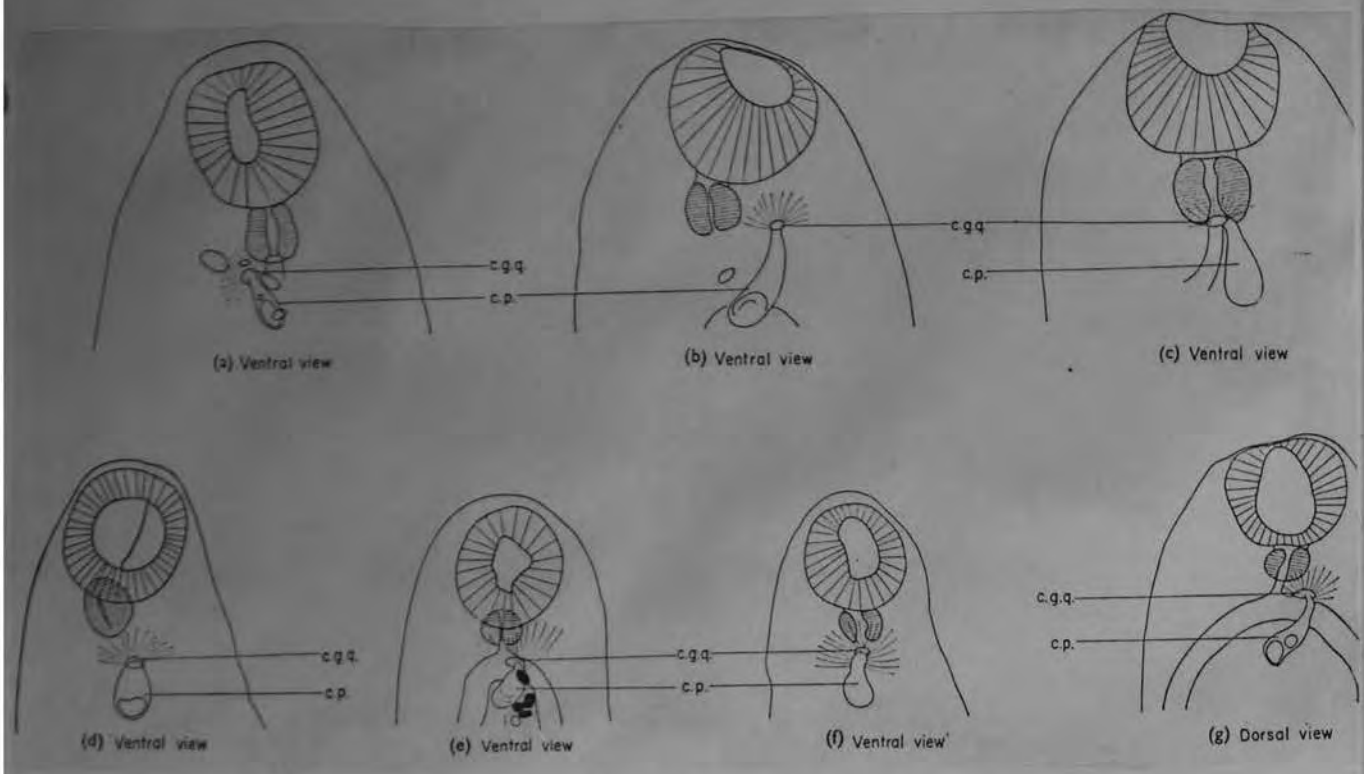
Babero & Okpala estudam espécimes encontrados no intestino delgado de **Agama colonorum** na Nigéria, e, conforme as variações observadas julgam provável sua sinonimia com **M. sociale** (Luehe, 1901).

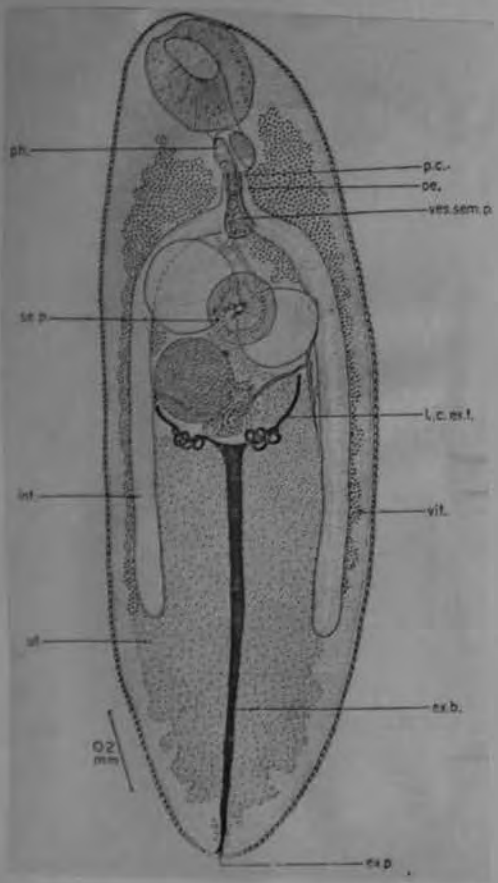
Saoud, em 1964, assinala-a em **Rana (Ptychadena) mascareniensis** e **Agama agama agama** (sin.: **Agama colonorum**) no Camerum.

Dollfus, em 1929, ao descrever **Mesocoelium monodi,** refere a presença de pequenos espinhos dispostos em fileiras concêntricas na abertura do acetábulo, caráter êsse não referido por Prudhoe em 1957. Como Dollfus examinara exemplares não comprimidos e como não víramos êsses espinhos no material em bálsamo que estudamos para nossa revisão, interpretamos, então, como sendo êles espinhos do corpo. Entretanto Capron, Deblock & Brygoo, que examinaram espécimes vivos e fixados, quer retraídos ou comprimidos, referem: son bord (de la ventouse ventrale) présente quatre a cinq rangées concentriques de minucules épines verruqueuses de 2,5 micra, rayonnantes, difficilement perceptibles.

Êsse caráter, não existe em **Mesocoelium monas** (Rudolphi, 1819) permitirá, provàvelmente, distinguir as duas espécies.

J.F. Teixeira de Freitas





from: The anatomy, life history and size allometry of Mesocoelium monodi Dollfus, 1929. J. D. Thomas

J. Zool. 1965. 146: 413-446

Mesocoelium oligoon Johnston,1912

Small,delicate worms, oval, 1.53 by 0.59. Body covered with very small spines,comparatively few in number; oral sucker subterminal 0.215 in diameter, ventral sucker at the junction of the anterior and middle body-thirds,small, 0.129 in diameter; ratio of oral to ventral, 5:3. Pharynx globular (0.065); intestinal limbs short,of unequal length. Testes polyhedral, large, 0.165 by 0.099, about 1/9 the body length; ovary oval, with smooth contour, large (0.133 by 0.09) situated behind the right testis. Yol follicles rounded to oval, 28 to 52 μ long, comparatively numerous, about 70 on each side, closely arranged in a somewhat triangular group on each side of the esophagus, extending backwards laterally to beyond the intestinal limbs. Eggs few in number, comparatively large, 39 to 52 by 28 μ, average length 44 μ, thick shelled, with , at the narrower end, a much thickened patch of shell that is often developed into a blunt process.
Host: Hyla citropus, in the duodenum
Locality: Australia

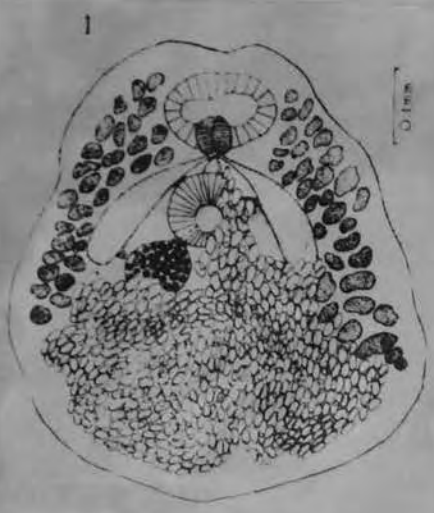
Mesocoelium pesteri sp. nov. SAOUD, 1964

A total of thirteen specimens were found in the collection from a male hornless chameleon. As stated on the label accompanying them, they were collected from the anterior part of the intestine and fixed in 10% formalin. Examination of these trematodes in whole mounts and sectioned material revealed that they belong to a hitherto unknown species of the genus *Mesocoelium*, which is described here as *M. pesteri* sp. nov., after Mr. F. R. N. Pester of the Department of Parasitology, London School of Hygiene and Tropical Medicine.

Description.—The body is small, oval measuring 0·736 mm.–0·832 mm. with a maximum breadth of 0·448 mm.–0·688 mm. attained at the middle third of the body. The body is covered anteriorly with backwardly directed spines which are very numerous at the anterior extremity and become less dense posteriorly, nearly the whole of the posterior half of the body is devoid of spines. Each of these spines measures about 3–4 μ. The oral sucker is subterminal and relatively large. It measures 0·183 mm.–0·189 mm. × 0·108 mm.–0·135 mm. The acetabulum lies usually in the anterior third of the body. It is smaller than the oral sucker, measuring 0·11 mm.–0·131 mm. in diameter. The distance between the posterior border of the oral sucker to the anterior border of the acetabulum is about 0·06 mm. Rarely, in apparently badly preserved specimens, the acetabulum is very close to the oral sucker. Posterior to the oral sucker and almost dorsal to it there is a well developed muscular pharynx. It measures about 0·07 mm.–0·08 mm. in diameter. No prepharynx is present in any of the available material. The pharynx leads to a very short and narrow oesophagus which measures up to 0·015 mm. in length. In some specimens the oesophagus is almost completely absent. The two intestinal caeca are short, saccular with fairly thick walls. Serial sagittal sections of two specimens revealed that the thickness of the intestinal walls is due to the lining, throughout the entire length, with a thick layer of columnar epithelium with secretory cells in between. This confirms that the shortness and the thickness of the intestinal caeca are not due to contraction. In most specimens the caeca end at the same level as the testes, but in some others they reach the ovary. These caeca never terminate posterior to the level of the ovary. In some specimens this needed confirmation by serial sagittal sectioning.

Two large, nearly symmetrical testes are situated one on each side of the body in the acetabular region. They are circular to oval in shape with smooth outline measuring about 0·121 mm.–0·158 mm. × 0·106 mm.–0·127 mm. It is interesting to note that in most specimens the left testis (the one anterior to the ovary) is somewhat larger than the right one. This is the reverse to what has been described for *M. monodi* Dollfus, 1929 (Gupton *et al* 1961). The cirrus pouch is well developed, measuring 0·073 mm.–0·095 mm. × 0·032 mm. It is situated anteriorly and dorsal to the acetabulum and opens immediately posterior to the pharynx. It contains a well developed seminal vesicle and apparently the cirrus is not provided with spines.

The ovary is oval with a smooth outline. It lies posterior to the left testis and postero-lateral to the acetabulum, being usually in the middle third of the body. It is always smaller than the testis measuring about 0·09 mm. × 0·07 mm. Lateral to the ovary are Mehlis' gland and the receptaculum seminis. The receptaculum seminis is usually dorsal and slightly posterior to Mehlis' gland.



Mesocoelium pesteri sp. nov.
Fig. 1.—Ventral view of the adult.

— OVER —

The uterus is voluminous, occupying most of the posterior half of the body and extending anteriorly, ventral to the testes, to reach the level of the acetabulum. It opens together with the cirrus pouch at the genital pore which lies immediately posterior to the pharynx. The follicular vitellaria extend along the lateral fields of the body from the anterior level of the oral sucker to the end of the middle third of the body, sometimes reaching the posterior end. They definitely extend far posterior to the terminations of the intestinal caeca. The eggs are numerous, small and oval. The immature eggs are almost colourless but the mature ones are dark brown. They measure 29·36·5 μ × 18·2–21·9 μ.

Although sectioning revealed most of the internal anatomy, the excretory system could not be traced.

Host : Hornless chameleon.

Location : Small intestine.

Locality : Kumba, Cameroons (West Africa).

Type : Department of Parasitology, London School of Hygiene and Tropical Medicine.

Affinities : The above description leaves no doubt that the species under consideration belongs to the genus *Mesocoelium* Odhner, 1910. According to Dollfus (1954) the identification of the species belonging to that genus has become rather difficult due to the wide range of morphological variations of its species. As far as the identification of these trematodes is concerned Dollfus pointed out the importance of the locality of the host rather than its systematic position since one and the same species of the genus *Mesocoelium* might be reported from amphibians, snakes or lizards.

In a recent revision of the genus *Mesocoelium*, Cheng (1960) has listed twenty-eight valid species in it. He considered *Pintnaria mesocoelium* (Cohn, 1903) Poche, 1907 as a synonym of *Mesocoelium schwetzi* Dollfus, 1950. Accordingly he made a new combination *Mesocoelium mesocoelium* (Cohn, 1903) Cheng, 1960. In the writer's opinion this synonymy is not justifiable until some more specimens of *Pintnaria mesocoelium* are studied, since both species were recorded from two different hosts with different geographical distribution.

According to Capron *et al.* (1961) seven species of the genus *Mesocoelium* have been reported from African amphibians and reptiles. It appears that these authors have overlooked another three species described from the Congo by Vercammen-Grandjean, (1960) making a total of ten species reported from Africa.

M. pesteri sp. nov. can be readily differentiated from *M. carli* André, 1915 by the fact that although both species are within the same range of body measurements, the sizes of the oral sucker and the acetabulum in the former are about double those described for the latter. The pharynx of *M. pesteri* is also larger than that of *M. carli*, being 0·07 mm.–0·08 mm. and 0·025 mm. respectively. The position of the genital pore in *M. pesteri* is never posterior to the intestinal bifurcation as it is in *M. carli*. The intestinal caeca are also markedly different in both species.

Although *M. monodi* Dollfus, 1929 is a rather variable form, it can be differentiated from *M. pesteri* sp. nov. by the extent of the development of the intestinal caeca, which are long and reach the posterior third of the body in the former and are short in the latter. The measurements of the pharynx, the cirrus pouch and the eggs are also different.

Mesocoelium pesteri Saoud, 1964
comparisons (continued)

M. pesteri can be easily differentiated from both *M. maroccanum* Dollfus, 1951 and *M. georgesblanci* Dollfus, 1954 by its shorter intestinal caeca, smaller body measurements and smaller eggs.

The extent of the development of the intestinal caeca in *M. pesteri* and *M. brachyenteron* Dollfus, 1954 is very similar. However both species can be differentiated easily by the larger size of the body in *M. brachyenteron*, being 3·3–4·8 mm. × 1·7 mm. whilst the corresponding measurements in *M. pesteri* are 0·736–0·832 mm. × 0·448–0·668 mm. The ratios of the oral sucker to the acetabulum in both species are also different, being about 1·44 : 1 in *M. pesteri* and about 1·18 : 1 in *M. brachyenteron*.

M. pesteri can be distinguished from *M. schwetzi* Dollfus, 1950 by the extent of the development of the intestinal caeca, which are short and never extend posterior to the middle of the body in the former whereas in the latter they extend posterior to the middle of the body. The distribution of the vitellaria in relation to the intestinal caeca is also different in both species. There are also major differences in the measurements of the body, pharynx and cirrus pouch.

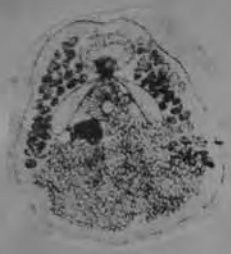
M. pesteri differs also from *M. magrebense* Dollfus, 1954 in the position of the genital pore, which is anterior to the intestinal bifurcation in the former and posterior to it in the latter. The ovary is larger than either of the testes in *M. magrebense*, whilst the testes are larger than the ovary in *M. pesteri*.

M. pesteri is distinguished from *M. hatternae* Vercammen-Grandjean, 1960 by the distribution of the vitellaria in relation to the intestinal caeca and by the extent of the intestinal caeca relative to the body. On almost similar grounds *M. pesteri* can be distinguished from *M. brieni* Vercammen-Grandjean, 1960 and *M. caparti* Vercammen-Grandjean, 1960.

M. pesteri can be also distinguished from the Asiatic species *M. elongatum* Goto *et al.*, 1929, *M. japonicum* Goto *et al.*, 1930 and *M. ovatum* Goto *et al.*, 1930 by the distribution of the vitellaria. These extend far posterior to the terminations of the intestinal caeca in *M. pesteri* whilst in all the other species they are restricted to the anterior third of the body. On similar grounds *M. pesteri* can be differentiated from the Australian species *M. megaloon* Johnston, 1912, *M. mesembrinum* Johnston, 1912 and *M. oligoon* Johnston, 1912.

M. pesteri sp. nov. is rather similar to *M. minutum* Park, 1939 which was described from *Bufo vulgaris japonicus* in Japan. This similarity is represented by the small size of the body, the short saccular intestinal caeca and the positions of the gonads in relation to the acetabulum. However they can be differentiated by the distribution of the vitellaria in relation of the intestinal caeca, the position of the genital pore and the length of the oesophagus. The eggs of *M. minutum* are also larger than those in *M. pesteri*, being 42–62 μ × 20–34 μ in the former and 29·0–36·5 μ × 18·2–21·9 μ in the latter. The geographical distribution of both species is also different.

Mesocoelium pesteri Saoud, 1964: 291. 292-297, fig. 1
Habitat — Intestino delgado de "hornless chameleon".
Distribuição geográfica — Camerum (Kumba).
Tipo — Depositado no Departament of Parasitology, London School of Hygiene and Tropical Medicine.



O estudo de 13 espécimes (provàvelmente não comprimidos) permitiu a Saoud referir os seguintes caracteres:

Corpo oval, com 0,736 a 0,832 mm de comprimento por 0,448 a 0,688 mm de largura; cutícula espinhosa; espinhos mais densos anteriormente e ausentes na metade posterior do corpo; ventosa oral subterminal, com 0,183 a 0,189 mm de comprimento por 0,109 a 0,155 mm de largura; acetáculo no têrço anterior do corpo, com 0,11 a 0,131 mm de diâmetro; préfaringe ausente; faringe musculosa, com 0,07 a 0,08 mm de diâmetro; esôfago curto e delgado; cecos intestinais curtos e saculares, terminando ao nivel dos testículos ou do ovário; poro genital imediatamente posterior à faringe; bôlsa do cirro anterior e dorsal ao acetábulo, com 0,073 a 0,095 mm de comprimento por 0,032 mm de largura, contendo vesícula seminal bem desenvolvida e cirro aparentemente não espinhoso; testículos quase simétricos, na região acetabular, redondos ou ovais, lisos, com 0,121 a 0,158 mm de comprimento por 0,106 a 0,127 mm de largura; ovário ovóide e liso, pós-testicular e pós lateral ao acetábulo, com 0,09 mm de comprimento por 0,07 mm de largura; espermateca e glândula de Mehlis presentes, na zona ovariana; útero ocupando a porção posterior do corpo; ovos pardacentos, com 0 029 a 0,036 mm de comprimento por 0,018 a 0,022 mm de largura; vitelinos com folículos que se estendem do nivel da ventosa oral até o fim do têrço médio do corpo, algumas vêzes atingindo sua extremidade posterior; vesícula excretora não evidenciada.

Espécie indistinguivel de **M. monas** (Rudolphi, 1819), devendo ser incluida em sua sinonimia.

J.F. Teixeira de Freitas

FISCHTHAL AND KUNTZ, 1965

FAMILY MESOCOELIDAE

Mesocoelium scatophagi n. sp. (Figs. 3, 4)

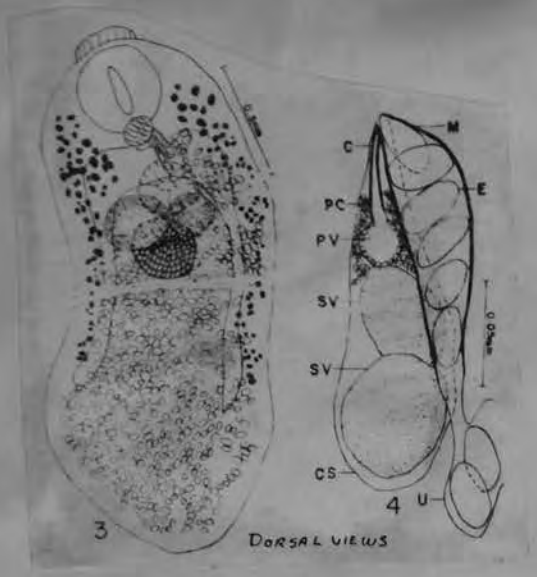
HOST: *Scatophagus argus* (Scatophagidae).
HABITAT: Small intestine.
LOCALITY: Jesselton, North Borneo.
DATE: 29 August 1960.

HOLOTYPE: U.S.N.M. Helm. Coll. No. 60817.

DIAGNOSIS (based on single specimen): Body 1,328 by 568, cuticle spinose, spines sparse posteriorly. Preoral lobe 55 long, distinct hoodlike. Forebody 328, hindbody 874. Oral sucker 213 by 206, subterminal ventral. Acetabulum 126 by 161, at end of anterior body third. Sucker length ratio 1 : 0.59. Prepharynx and esophagus short. Pharynx 77 by 71. Cecal bifurcation overlapping acetabulum, cecal shoulders inflated, ceca extending to 33 from posterior extremity on right and 444 on left. Excretory pore terminal.

Testes two, smooth, symmetrical, posterior to but slightly overlapping acetabulum. Right testis 119 by 144, left testis 142 by 166. Vasa efferentia uniting to form short vas deferens. Cirrus sac 150 by 61, thin walled, overlapping acetabulum 65. Internal seminal vesicle bipartite, anterior chamber 52 by 33, posterior chamber 54 by 31. Prostatic vesicle 15 by 14, surrounded by prostate cells. Cirrus straight, slightly thick walled, muscular. Genital atrium small. Genital pore median, ventral to oral sucker, slightly posterior to sucker opening. Ovary 161 by 179, median, posteroventral to testes. Seminal receptacle 40 by 60, posterodorsal to ovary. Vitelline reservoir small, posterodorsal to ovary, ventral to seminal receptacle. Vitellaria in lateral fields, commencing at oral sucker level and terminating just short of cecal ends; follicles small, dorsal, lateral and ventral to ceca, more numerous preacetabular. Uterus filling hindbody, ventral to gonads, ascending on right. Metraterm thick walled, shorter than cirrus sac. Eggs numerous, operculate, ten measuring 33 to 41 by 21 to 25.

DISCUSSION: This is the first record of *Mesocoelium* Odhner, 1911, from a fish. Skrjabin and Mozgov (1959), Cheng (1960), and Freitas (1963) reviewed the genus, noting the presence of all species in amphibians and reptiles. In the key to the 28 species recognized by Cheng (1960) our specimen keyed to *M. megaluon* Johnston, 1912, but it differs from the latter in the position of the genital pore, extent of the ceca and vitellaria, sucker length ratio, ovary size in relation to the testes, and in having a spined cuticle and a prominent hoodlike preoral lobe. In the key to the seven species recognized by Freitas (1963) our specimen keyed to *M. monas* (Rudolphi, 1819) Freitas, 1958, but it differs in having a prominent hoodlike preoral lobe. Freitas listed as synonyms of *M. monas* at least 19 species described from a wide variety of amphibians and reptiles from South America, Central America, North America, Africa, Asia, and Oceania. While much variation is evident in species of *Mesocoelium* we wonder whether the synonymy based solely on morphological characteristics of specimens from so many different hosts with so great a geographical distribution is entirely valid. It appears to us that the question of species validity cannot be answered satisfactorily until most life histories are elucidated.



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Mesocoelium scatophagi Fischthal & Kuntz, 1965: 66, 67-68, figs. 3-4

Habitat — Intestino delgado de **Scatophagus argus.**

Distribuição geográfica — Malásia (Jesselton, North Borneo).

Tipo — Depositado no USNM Coll. Helm. n. 60075.

Espécie parasita de peixe, descrita de um só exemplar, com os seguintes caracteres:

Corpo com 1,328 mm de comprimento por 0,568 mm de largura; cutícula espinhosa, com espinhos esparsos posteriormente; lobo pré-oral distinto, em forma de coifa, com 0,055 mm de comprimento; ventosa subterminal, com 0,213 mm de comprimento por 0,206 mm de largura; acetábulo no fim do têrço anterior do corpo, com 0126 mm de comprimento por 0,161 mm de largura; relação entre as ventosas igual a 1:0,59; pré faringe e esôfago curtos; faringe com 0,077 mm de comprimento por 0,071 mm de largura; bifurcação intestinal na área acetabular; cecos intestinais dilatados na porção inicial estendendo-se até uma distância de 0,331 mm e de 0,444 mm da extremidade posterior do corpo; poro genital mediano, levemente posterior à abertura da ventosa oral; bôlsa do cirro em parte na área acetabular, com 0,150 mm de comprimento por 0,061 mm de largura, encerrando vesícula seminal bilobada, porção prostática e cirro; testículos lisos, simétricos, quase totalmente pós-acetabulares, medindo 0,119 mm de comprimento por 0,144 mm de largura e 0,142 mm por 0,166 mm; ovário mediano, parcialmente pós-testicular, com 0,161 mm de comprimento por 0,179 mm de largura; espermateca póstero-dorsal ao ovário, com 0,040 mm de comprimento por 0,060 mm de largura; útero ocupando a porção posterior do corpo, ventral às gônadas; ovos operculados, com 0,033 a 0,041 mm de comprimento por 0,021 a 0,025 mm de largura; vitelinos constituídos por folículos pequenos, dorsais, laterais e ventrais aos cecos intestinais, estendendo-se da zona da ventosa oral até quase o nível das terminações cecais; poro excretor terminal.

Essa espécie distingue-se das demais pela presença do lobo pré-oral, em forma de coifa.

J. F. Teixiera de Freitas, 1967

[18. — **Mesocoelium schwetzi** DOLLFUS, 1950.]

(Fig. 22.)

Hôte : *Bufo regularis* REUS.

Localité : Grotte de Djomba (Kivu).

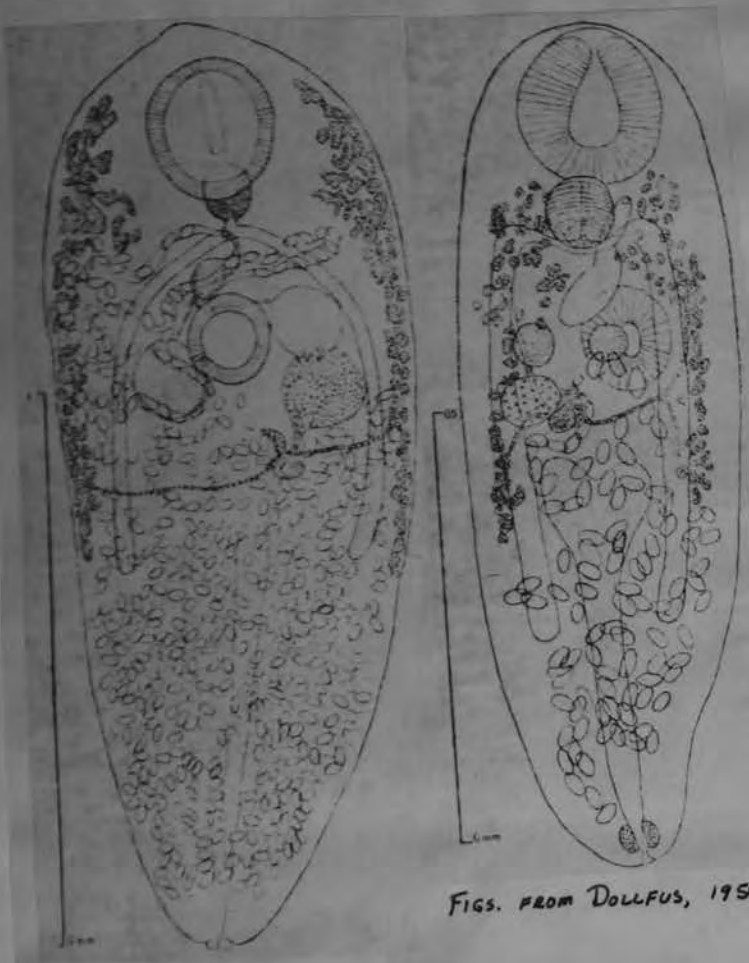
Nous avons récolté onze exemplaires de ce Trématode dans l'intestin d'un Crapaud capturé près de l'entrée d'une grotte à Chauve-souris.

La longueur varie entre 2 et 3,5 mm et la plus grande largeur entre 617 μ et 1 mm. La cuticule du tiers antérieur du corps est soulevée en petites écailles. La ventouse orale a 251 à 411 μ de diamètre et la ventrale 183 à 256 μ; le rapport des deux ventouses est donc 1 : 0,2 à 0,3. Le pharynx mesure 183 à 200 μ de long sur 137 μ de diamètre et les deux cæcums atteignent le quart postérieur du Ver.

Les deux testicules plus ou moins sphériques sont de petite taille; ils ont 160 à 190 μ sur 69 à 90 μ et se trouvent en partie à la face dorsale de la ventouse ventrale. La poche du cirre a 250 à 343 μ de long sur 61 à 91 μ de diamètre. Elle débouche vers le milieu du pharynx sur la ligne médiane ou un peu à gauche de celle-ci (fig. 22). L'ovaire plus gros que les testicules a 150 à 229 μ sur 100 à 160 μ et est situé du côté droit, non loin du bord postérieur de la ventouse ventrale. Les glandes vitellogènes s'étendent du bord postérieur de la ventouse orale jusqu'à la moitié environ de la longueur des cæcums intestinaux. Les œufs ont 41 à 45 μ sur 23 μ.

Quoique nos échantillons soient constamment plus grands que ceux décrits par DOLLFUS (1950) et que les cæcums intestinaux s'étendent plus en arrière que dans l'espèce type, nous n'hésitons pas à les assimiler à *Mesocoelium schwetzi*. On sait d'ailleurs qu'il existe une grande variabilité morphologique dans ce genre et, si *M. schwetzi* se rapproche beaucoup de *M. monodi* DOLLFUS (loc. cit.) n'indique pas la longueur de la poche du cirre, mais dans les figures 33 et 34 de son travail, elle atteint et même dépasse le bord antérieur de la ventouse ventrale tandis que, dans tous nos spécimens, elle n'atteint pas ce niveau et ressemble par ce caractère à *M. monodi*. Il ne fait aucun doute que nous avons à faire ici à deux formes africaines, parasites de Vertébrés à sang froid, qui appartiennent à une seule et même espèce. Toutefois, avant de les réunir, il serait désirable de récolter un matériel abondant chez une diversité d'hôtes aussi grande que possible.

Mesoc



FIGS. FROM DOLLFUS, 1950

Mesocoelium sociale(Luehe, 190[illegible] Odhner, 1911

Mesocoelium sociale (Luehe, 1901) Odhner, 1911

Mesocoelium sociale Fischthal & Kuntz, 1964: 231-232

Habitat — Intestino delgado, raramente fígado, de **Bufo biporcatus philippinicus**.

Distribuição geográfica — Filipinas (Puerto Princesa, Ilha Palawan).

Os espécimes estudados por Fischthal & Kuntz, depositados no USNM Coll. Helm. n. 60913 (4 lâminas com 1 exemplar cada), per-Madagascar, descrevendo-os com os seguintes caracteres:

Corpo com 2.383 a 2.840 mm de comprimento por 0,913 a 1.135 mm de largura; cutícula espinhosa; ventosa oral com 0,224 a 0,298 mm de comprimento por 0,199 a 0,265 mm de largura e acetábulo com 0,152 a 0,224 mm por 0,147 a 0,222 mm; relação entre as ventosas variando de 1:0,68 a 1:0,83; prefaringe presente; faringe com 0,081 a 0,132 mm de comprimento por 0,088 a 0,136 mm de largura; esôfago presente; cecos intestinais terminando depois dos vitelinos; poro genital mediano ou não na zona da faringe, na porção posterior da zona da ventosa oral ou ao nível do esôfago; bôlsa do cirro em parte na área do acetábulo, com 0,186 a 0,314 mm de comprimento por 0,129 a 0,272 mm de largura, contendo vesícula seminal bilobada, região prostática e cirro; testículos oblíquos, com 0,165 a 0,250 mm de comprimento por 0,123 a 0,232 mm de largura e 0,155 a 0,232 mm por 0,129 a 0,272 mm, em parte na zona acetabular, intercecais ou um dêles avançando na área cecal; ovário deslocado lateralmente, com 0,155 a 0,245 mm de comprimento por 0,173 a 0,265 mm de largura; espermateca com 0,272 a 0,166 mm por 0,077 a 0,115 mm, em parte na área ovariana; ovos com 0,032 a 0,037 mm de comprimento por 0,021 a 0,024 mm de largura; vitelinos interrompidos no lado do ovário, oposto a um dos testículos.

Essa espécie é idêntica a **Mesocoelium monas** (Rudolphi, 1819).

J. F. Teixiera de Freitas, 1967

FAMILIA *MESOCOELIIDAE* DOLLFUS, 1933.

Mesocoelium travassosi Pereira y Cuocolo, 1940.

Once ejemplares arreglados en preparaciones totales nos han servido para realizar la presente descripción y todos fueron colectados el 18 de mayo de 1957. Son parásitos muy pequeños pues apenas alcanzan de 1.222 a 1.445 mm. de largo por 0.477 a 0.551 mm. de ancho; los extremos del cuerpo son redondeados y la cutícula se halla recubierta de pequeñas y angostas espinas las que se extienden hasta muy por detrás del final de los ciegos intestinales y miden de 0.006 a 0.008 mm. de largo por 0.002 mm. de ancho.

La ventosa oral es subterminal, más grande que el acetábulo, musculosa y mide de 0.075 a 0.096 mm. de largo por 0.187 a 0.195 mm. de ancho; el acetábulo es de contorno circular, está situado muy por detrás de la bifurcación intestinal, a nivel de los testículos y del ovario y mide de 0.137 a 0.256 mm. de largo por 0.137 a 0.162 mm. de ancho; la relación existente entre el tamaño del acetábulo y el de la ventosa oral es como sigue: 1:2.6 × 1:0.7 a 1:1.8 × 1:0.7. La boca es terminal, amplia y sus diámetros son de 0.096 por 0.083 mm. a 0.085 por 0.083 mm; existe una pequeña prefaringe y la faringe es casi esférica, se encuentra constituída por tres gruesas masas meridianas de músculos y mide de 0.071 a 0.079 mm. de largo por 0.075 a 0.079 mm. de ancho; el esófago es un órgano que varía en longitud, según el grado de contracción de la porción anterior del cuerpo del parásito y mide de 0.062 a 0.108 mm. de largo por 0.012

a 0.029 mm. de ancho; los ciegos intestinales son tubulosos, se extienden dorsolateralmente hasta un poco por detrás del ecuador del cuerpo y miden de 0.033 a 0.066 mm. de ancho.

Los poros reproductores están situados a nivel del arco bifurcal intestinal y sobre el principio o inicio del ciego intestinal izquierdo y distan de 0.378 a 0.408 mm. del borde anterior del cuerpo; los testículos son dos pequeños cuerpos, alargados, de contornos enteros que se colocan en posición oblicua, a uno y otro lado del acetábulo y dentro del área intercecal, mientras que el derecho es anterior el izquierdo es posterior y miden, el derecho o anterior de 0.087 a 0.129 mm. de largo por 0.075 a 0.083 mm. de ancho y el izquierdo o posterior de 0.091 a 0.116 mm. de largo por 0.075 a 0.083 mm de ancho; la bolsa del cirro es pequeña, se halla situada en la línea media del cuerpo, por detrás de la bifurcación intestinal, extendiéndose desde el nivel del borde anterior del testículo anterior, es tubulosa, está formada por dos porciones, la posterior es ancha y piriforme, en tanto que la anterior es tubulosa y presenta una dirección oblicua, las dos porciones se encuentran separadas por una estrangulación y mide de 0.129 a 0.141 mm. de largo por 0.042 a 0.046 mm. de ancho; la vesícula seminal ocupa casi toda la bolsa del cirro, se extiende tanto en la porción posterior como en la anterior de este órgano y también se halla estrangulada y mide de 0.096 a 0.118 mm. de largo por 0.033 a 0.037 mm. de ancho; la próstata se presenta constituída por escasas células que rodean la porción anterior y terminal de la bolsa del cirro; el órgano copulador es pequeño.

El ovario es un cuerpo ovoideo con tendencia a ser esférico, es de contorno liso y se sitúa por detrás del testículo anterior o derecho, es tangente al borde posterolateral derecho del acetábulo, dentro del área intercecal y mide de 0.096 a 0.146 mm. de largo por 0.104 a 0.108 mm. de ancho; la glándula de Mehlis es amplia, se encuentra sobre la línea media, a la altura del borde posterior del ovario y mide de 0.071 a 0.096 mm. de largo por 0.104 a 0.125 mm. de ancho; el útero es muy extenso, llena por completo la parte posterior del cuerpo, desde por detrás del ovario, el asa ascendente uterina cruza por el lado izquierdo del acetábulo, bordea internamente al ciego del mismo lado, lo cruza y va a terminar al poro reproductor femenino; los huevecillos son numerosos, ovoideos, de cáscara gruesa y parda, operculados y miden de 0.037 a 0.039 mm. de largo por 0.025 mm. de ancho.

Las glándulas vitelógenas se extienden desde el nivel del borde posterior de la faringe, en animales no contraídos, hasta el extremo posterior de los ciegos intestinales y ocupan exclusivamente las áreas extracecales; los folículos que son escasos y grandes, se concentran lateralmente desde el nivel de la faringe hasta el de la bifurcación intestinal; los viteloductos transversales son oblicuos y convergen hacia la glándula de Mehlis. El poro excretor es terminal posterior, pues se abre en el borde del cuerpo.

Hospedador: *Bufo marinus marinus* (Linnaeus).
Localización: Intestino delgado.
Localidad: Hacienda Lombardía, Tilarán, Provincia de Guanacaste, Costa Rica, Centroamérica.
Ejemplares; Colecciones Helmintológicas del Instituto de Biología. No. 216-3 y en la del Laboratorio de Helmintología de la Facultad de Microbiología de la Universidad de Costa Rica, así como en la de la Escuela Nacional de Ciencias Biológicas, I. P. N. No. 1-18.

Discusión: Los ejemplares que se han redescrito en líneas anteriores han sido clasificados como *Mesocoelium travassosi* Pereira y Cuocolo, 1940, atendiendo principalmente a la relación entre los tamaños del acetábulo y la ventosa oral que es de 1:2 y, además, a la posición del poro reproductor y al arreglo de las glándulas reproductoras así como a la disposición de los folículos vitelinos.

La porción anterior del cuerpo de estos parásitos es sumamente contráctil, lo que se traduce por una variación en el inicio de las glándulas vitelógenas, pues en animales contraídos, éstas suben hasta nivel de la ventosa oral y en no contraídos únicamente hasta nivel del borde posterior de la faringe, como hemos podido comprobar en nuestros ejemplares. También en estos parásitos los huevecillos poseen una cáscara gruesa, doble, carácteres que no hemos visto citados en las descripciones de Pereira y Cuocolo y en las posteriores de Zerecero y Díaz y de Caballero, Flores y Grocott.

Mesocoelium varunae Baug, 1956 Plagiorchiidae

Mesocoelium varunae Baug, 1956

3 a-c
Habitat — Intestino de **Bufo melanostictus** Schneider
Distribuição geográfica — Índia (Banaras, U. P.).
Tipo — ?

Descrita de grande número de espécimes colhidos no intestino de **Bufo melanostictus** capturado próximo ao rio Varuna, em Banaras, U. P., com os seguintes caracteres:

Corpo elítico, com 1,81 a 2,17 mm de comprimento por 0,57 a 0,72 mm de largura; cutícula espinhosa; espinhos mais proeminentes e densos na parte anterior do corpo; ventosa oral ventral, com 0,181 a 0,247 mm de comprimento por 0,181 a 0,264 mm de largura; acetábulo muito menor que a ventosa oral, situado no limite anterior do têrço médio do corpo, com 0,132 a 0,198 mm de comprimento por 0,132 a 0,181 mm de largura; préfaringe curta; faringe globular, com 0,066 a 0,082 mm de comprimento por 0,082 a 0,115 mm de largura; esôfago curto e largo; cecos intestinais de comprimentos desiguais, ultrapassando o limite posterior do têrço médio do corpo; poro genital bifurcal, mediano ou não; bôlsa do cirro pós-bifurcal e total ou parcialmente pré-acetabular, com 0,148 a 0,264 mm de comprimento por 0,049 a 0,066 mm de largura, contendo vesícula seminal bilobada, região prostática e cirro; testículos redondos ou ovais, oblíquos entre si, em parte na zona acetabular; testículo do campo ovariano com 0,115 a 0,198 mm de comprimento por 0,099 a 0,165 mm de largura; testículo oposto com 0,082 a 0,165 mm de diâmetro; ovário redondo ou ovóide, pós-acetabular, com 0,082, a 0,148 mm de comprimento por 0,082 a 0,132 mm de largura; espermateca arredondada, pós-ovariana, com 0,067 a 0,088 mm de diâmetro; glândula de Mehlis pós-ovariana, mediana; canal de Laurer presente; útero ocupando a porção pós-acetabular do corpo; ovos operculados, pardacentos, com 0,039 a 0,046 mm de comprimento por 0,026 a 0,028 mm de largura; vitelinos constituidos por folículos geralmente extracecais, que se estendem do limite posterior da zona faringeana até quase o nível da terminação dos cecos intestinais; poro excretor terminal; vesícula excretora alongada, dilatada na porção proximal.

Essa espécie é um sinônimo de **Mesocoelium monas** (Rudolphi, 1819) (sin.: **Mesocoelium sociale** (Luehe, 1901) Odhner, 1911), já descrita do mesmo hospedador, **Bufo melanostictus** Schneider.

J. F. Teixeira de Freitas, 1967

***Mesocoelium waltoni Pereira et Cuocolo**, 1940 (Fig. 38)

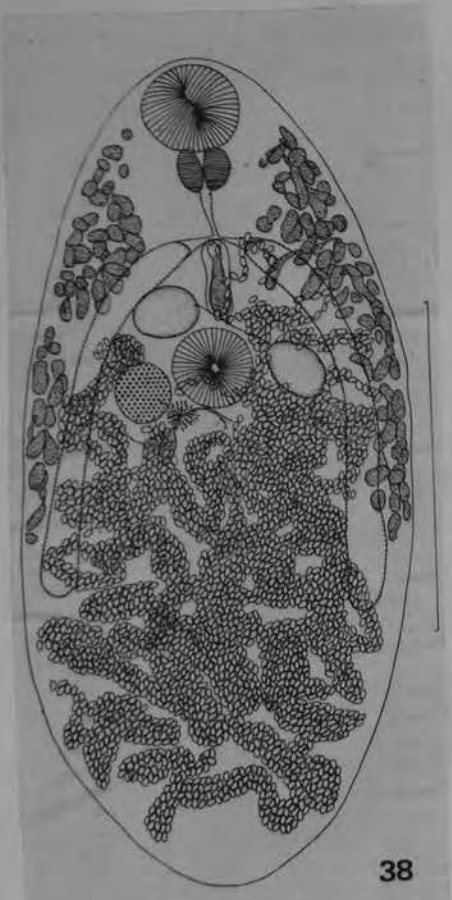
Arq. Inst. Biol., 11 : 182, fig. 7.

Only one host harbored 20 examples of this species.

Host : *Bufo marinus* Linnaeus-1 ex.
Habitat : Small intestine.
Locality : Tingo María (UNAS), Dpto. Huánuco.
Date : August 12, 1976.

Three host material were collected near Tingo María by the courtesy of Prof. C. A. Mazabel, Universidad Nacional Agraria de la Selva. The rest two toads did not harbor any trematode. Freitas (1963) synonymized this with *M. monas* (Rudolphi, 1819), Freitas, 1958, which has been already known from Peru, but we cannot agree with his opinion because genital pore is situated near cecal bifurcation, vitellaria are distributed posteriorly to the ends of ceca, and ovary is similar to testes in size, in this species.

From Miyazaki, Kifune, Habe and Uyema, 1978



38

Brachycoeliidae

Fig. 38. *Mesocoelium waltoni* from *Bufo marinus*. Scale: 1 mm.

MESOCOELIUM